ARCHIVES

OF

OPHTHALMOLOGY

103680

EDITED IN ENGLISH AND GERMAN

BY

DR. H. KNAPP
OF NEW YORK

AND

DR. C. SCHWEIGGER
OF BERLIN

DR. W. A. HOLDEN
OF NEW YORK
ASSISTANT EDITOR

VOLUME XXIX.

With 31 plates, numerous text illustrations, and an index to authors and subjects of Vol. XXIX. (pp. 675–681)

NEW YORK
G. P. PUTNAM'S SONS, 27 & 29 WEST 23D STREET
AND NEW ROCHELLE, N. Y.
LONDON: 24 BEDFORD STREET, STRAND
WIESBADEN: I. F. BERGMANN'S Verlag
PARIS: J.-B. BAILLIÈRE, 19 Rue Hautefeuille
1900

The Knickerbocker Press, New York

CONTENTS OF VOLUME XXIX.

NUMBER I.

PAGE

1. Double Nasal Hemianopsia Following a Fall on the Head. By **Swan M. Burnett,** M.D., Ph.D., Washington, D.C. (With four text illustrations) 1

2. Tuberculosis of the Conjunctiva. By **J. W. H. Eyre,** M.S., M.D. (With Plates IX. and X. of Vol. XL., German Edition) . . 12

3. The Successful Treatment of Three Important Cases of Disease of the Eyes by the Combined Method of HG and KI Internally and Pilocarpine Hypodermically. By **G. Herbert Burnham,** M.D., Tor.; F.R.C.S., Edin. 28

4. A Case of Extensive Detachment of the Retina in a Myopic Eye in which Complete Recovery Followed Rest in Bed and the Administration of Pilocarpine. By **Samuel Theobald,** M.D., Baltimore. (With a text illustration) 34

5. A Further Contribution to the Value of the X-Rays in Detecting Metallic Particles in the Eye, with Remarks on Other Methods. By **A. B. Kibbe,** M.D., Seattle, Washington 37

6. Treatment of Corneal Ulcers and Corneal Fistulæ by Electrolysis. By **Frank Cornwall,** M.D., San Francisco, Cal. . . . 47

7. On the Injection of a Weak Sterile Solution of Sodium Chloride into Collapsed Eyes. By **Joseph A. Andrews,** M.D., New York. (With a text illustration) 50

8. Series of One Hundred Cases of Cataract Extraction. By Dr. **C. E. Finlay,** Havana, Cuba 54

9. A Case of Angioma Orbitæ Fibrosum. By Dr. **Ernst Neese,** Translated by Dr. WARD A. HOLDEN. (With three figures on Plate II. of Vol. XXXV., German Edition) 69

10. On Fibroma of the Corneal Limbus in Spring Catarrh. By Dr. **Hans Schlub.** Abridged Translation by Dr. WARD A. HOLDEN. (With five figures on Plates IV.–V. of Vol. XXXV., German Edition) 79

PAGE

11. On Twin Ganglion Cells in the Human Retina. By Prof. **R. Greeff,** Berlin. Abridged Translation by Dr. WARD A. HOLDEN. (With three figures on Plate VI. of Vol. XXXV., German Edition) 85

12. Case of Glioma Retinæ and Brain Metastases, with Autopsy and Review of Literature. By Dr. **F. M. Wilson,** Bridgeport, Conn., and Dr. **Edgar S. Thomson,** New York. (With Text-plate I.) 91

13. A Case of Congenital Irideremia. By **Royal S. Copeland,** A.M., M.D., Ann Arbor, Mich. 101

14. Attempted Evulsion of Both Eyes by an Insane Patient. By Dr. **David Coggin,** Salem, Mass. 102

15. Report of the Section on Ophthalmology and Otology of the New York Academy of Medicine, October 16, 1899. By Dr. **J. Herbert Claiborne,** Secretary 103

16. Report on the Ninth International Ophthalmological Congress, Held at Utrecht, August 14–18, 1899. Conclusion. By Prof. **R. Greeff,** Berlin. Translated by Dr. WARD A. HOLDEN . . 109

17. Book Notices 138
I.—Refraction and How to Refract. By James Thorington, A.M., M.D.
II.—A Manual of the Diagnosis and Treatment of the Diseases of the Eye. By Edward Jackson.

18. Miscellaneous Notes 139

19. Contents of the Last Number of the *Archiv für Augenh.* . . 140

NUMBER 2.

1. Report of a Case of Orbital Cavernoma Removed by Krönlein's Method, with Preservation of the Eyeball. By Dr. **Arnold H. Knapp,** New York 141

2. Iritis, the Result of Dental Irritation. By **B. L. Millikin,** A.M., M.D., Cleveland 145

3. A Case of Contusion Injury of the Eyeball, Followed by Fulminant Glaucoma; Recovery without Operation. By **H. L. Myers,** M.D., Norfolk, Va. 150

4. Contributions to the Diagnosis, Symptomatology, and Statistics of Congenital Color-Blindness. By Dr. **Wilibald A. Nagel.** Abridged Translation by Dr. WARD A. HOLDEN. (With four figures on Plate II. of Vol. XXXVIII., German Edition, and one diagram in the text) 154

5. Glaucoma after Neuro-Retinitis Albuminurica. A Contribution to the Pathological Anatomy of Glaucoma. By Dr. **Eugene Wehrli.** Abridged Translation by Dr. WARD A. HOLDEN. (With Plates A–D of Vol. XXXVII., German Edition) . . 169

PAGE

6. Clinical Reports of Two Cases. By **V. L. Raia,** M.D., Providence, R. I. 188

7. The Palpebral Reaction of the Pupil—(Galassi). By **H. Gifford,** M.D., Omaha, Neb. 191

8. Report of the Meeting of the Section on Ophthalmology and Otology of the New York Academy of Medicine, held Monday Evening, January 15, 1900. By Dr. **J. H. Claiborne,** Secretary . . 196

9. Systematic Report on the Progress of Ophthalmology in the Third Quarter of the Year 1899. By Dr. **St. Bernheimer,** in Vienna; Dr. **O. Brecht,** Prof. **R. Greeff,** Prof. **C. Horstmann,** and Dr. **R. Schweigger,** in Berlin. With the assistance of Dr. G. Abelsdorff, Berlin; Dr. Swan M. Burnett, Washington; Dr. Dalén, Stockholm; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. Krahnstöver, Rome; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; Dr. Sulzer, Paris; W. J. Lister, F.R.C.S., England; Dr. C. H. A. Westhoff, Amsterdam. Translated by Dr. WARD A. HOLDEN 204

A.—Dr. C. HORSTMANN. General ophthalmological literature, 204; General pathology, diagnosis, and therapeutics, 206; Instruments and remedies, 211.

B.—Dr. ST. BERNHEIMER. Anatomy, 214; Physiology, 216; Refraction and accommodation, 219; Muscles and nerves, 221.

C.—Dr. R. SCHWEIGGER. Lids, 224; Lachrymal apparatus, 227; Orbit and neighboring cavities, 228; Conjunctiva, 232; Cornea, sclera, and anterior chamber, 236.

D.—Dr. O. BRECHT. Lens, 239; Iris, 240; Choroid, 240; Vitreous, 242; Glaucoma, 242; Sympathetic ophthalmia, 244.

E.—Dr. R. GREEFF. Retina and functional disturbances, 244; Optic nerve, 246; Injuries, foreign bodies (parasites), 249; Ocular affections in general diseases, 251.

10. Book Notices 254

III.—Das Sarkom des Auges. By Dr. R. Putiata Kerschbaumer.

IV.—Die Neurologie des Auges. By Dr. H. Wilbrand and Dr. A. Sänger.

V.—The Refraction of the Eye. By A. Edward Davis, M.D.

VI.—Skiascopy. *The Keystone* (organ of the optical trades).

VII.—The American Year-Book of Medicine and Surgery. Under the editorial charge of George M. Gould, M.D.

VIII.—A Pocket Medical Dictionary. By George M. Gould, M.D.

11. Miscellaneous Notes 259

Resignations and Appointments.
Hospital News, Society Meetings, etc.

NUMBER 3.

1. The Order of Development of Color Perception and of Color Preference in the Child. By **Ward A. Holden,** M.D., and **K. K. Bosse,** B.S., New York 261

2. On Tuberculosis of the Eye. By Dr. **Ernst Lubowski,** Kattowitz. Abridged Translation by Dr. WARD A. HOLDEN . . 278

3. A Case of Bilateral So-Called Coloboma of the Macula Lutea. By Dr. **Kimpel.** Translated by Dr. WARD A. HOLDEN. (With two drawings on Plates I.–II. of Vol. XXVII., German Edition) 283

PAGE

4. Retrobulbar Neuritis, with Permanent Central Scotoma, Following the Treatment of Extensive Burns with Iodoform. By **L. D. Brose,** M.D., Ph.D. (With two V. F. charts) 289

5. Hemiopia Following Poisoning by Illuminating Gas, with Report of a Case. By **Harry Friedenwald,** M.D., Baltimore, Md. (With a chart of the field of vision) 294

6. The Occurrence of Retraction Movements of the Eyeball together with Congenital Defects in the External Ocular Muscles. By **Julius Wolff,** M.D., New York. (With three figures on Text-plate II. and three figures in the text) 297

7. Report of a Case of Retraction Movements of the Eyeball. By Dr. **A. N. Alling,** New Haven, Conn. (With two figures on Text-plate III.) 310

8. Retraction Movements in a Case of Congenital Contraction of the Internal and Paralysis of the External Rectus of the Left Eye. By **Herman Knapp,** New York 311

9. A Case of an Attack of Glaucoma Following Instillation of Euphthalmin. By **Herman Knapp** 313

10. Systematic Report on the Progress of Ophthalmology in the Fourth Quarter of the Year 1899. By Dr. **St. Bernheimer,** in Vienna; Dr. **O. Brecht,** Prof. **R. Greeff,** Prof. **C. Horstmann,** and Dr. **R. Schweigger,** in Berlin; with the assistance of Dr. G. Abelsdorf, Berlin; Prof. E. Berger, Paris; Dr. Swan M. Burnett, Washington; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. Krahnstöver, Rome; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; Dr. C. H. A. Westhoff, Amsterdam; and others. Translated by Dr. WARD A. HOLDEN 315

A.—Prof. C. HORSTMANN. General ophthalmological literature, 315; General pathology, diagnosis, and therapeutics, 317; Instruments and remedies, 319.

B.—Dr. ST. BERNHEIMER. Anatomy, 320; Physiology, 321; Refraction and accommodation, 322; Muscles and nerves, 325.

C.—Dr. R. SCHWEIGGER. Lids, 326; Lachrymal apparatus, 328; Orbit and neighboring cavities, 329; Conjunctiva, 331; Cornea, 333.

D.—Dr. O. BRECHT. Lens, 335; Iris, 336; Choroid, 337; Glaucoma, 337.

E.—Dr. R. GREEFF. Retina and functional disturbances, 339; Optic nerve, 344; Injuries, foreign bodies, parasites, 346; Ocular disturbances in general diseases, 347.

NUMBER 4.

1. The Ophthalmic History of an English School (A.D. 1856 to 1900). By Mr. **Sydney Stephenson.** (With Text-plate IV. and one figure in text) 351

2. On Hemorrhagic Retinitis in Consequence of Endarteritis Proliferans, with Microscopic Examination of a Case. By Dr. **M. Reimar.** Abridged Translation by Dr. WARD A. HOLDEN. (With 32 figures on Plates IX.–XII. of Vol. XXXVIII., German Edition) 374

PAGE

3. Anatomical Examination of a Case of so-called Coloboma of the Optic Nerve. By Dr. **Martin Goerlitz,** Freiburg-in-Baden. Abridged Translation by Dr. WARD A. HOLDEN. (With two figures on Plates XIV.–XV. of Vol. XXXV., German Edition) . 392

4. Distention of the Sheath of the Optic Nerve with Cerebro-Spinal Fluid. Osteoplastic Resection of the Outer Wall of the Orbit (Kroenlein's Operation). By **Matthias Lanckton Foster,** M.D. 397

5. The Axes of Rotation of the Ocular Muscles, with a Simple Method of Calculating their Position, and the Correction of Certain Errors. By **Harold Wilson,** M.D., Detroit, Mich. (With three figures in the text) 404

6. The Theory of Accommodation. By **W. N. Suter,** M.D., Washington, D. C. (With three text-illustrations) 417

7. On Strictly Simple Evisceration of the Eyeball. By Dr. **H. Gifford,** Omaha, Neb. 422

8. Reports of the Section of Ophthalmology and Otology of the New York Academy of Medicine. Ophthalmological Part. By Dr. **Arnold Knapp,** Acting Secretary, and Dr. **J. H. Claiborne,** Secretary 426

9. Report of the Transactions of the Ophthalmological Society of the United Kingdom, Friday, July 6, 1900. By Mr. **C. Devereux Marshall** 434

10. Report of the Transactions of the American Ophthalmological Society at its Annual Meeting, Held at Washington, D. C., May 7 and 8, 1900 438

11. Book Notices 457

IX.—Atlas und Grundriss der Ophthalmoscopie und Ophthalmoscopischen Diagnostik. 3d ed. Von Prof. O. Haab.

X.—Diseases of the Eye. By Edward Nettleship, F.R.C.S., London. 6th ed.

XI.—A Dictionary of Medicine and the Allied Sciences. By Alex. Duane, M.D. 3d ed.

XII.—Manual of the Diseases of the Eye, for Students and General Practitioners. By Charles H. May, M.D.

12. Miscellaneous Notes 460

NUMBER 5.

1. A Case of Traumatic, at First Doubtful, Orbital Sarcoma, Followed by Aseptic Thrombosis of the Cavernous Sinus. By Dr. **Herman Knapp,** New York. (With five figures, the first four on Text-plates VI.–IX., the fifth in the text) 463

2. Spasmodic Action of the Obliques in Cases of Abducens Paralysis. By **Alexander Duane,** M.D., New York 476

PAGE

3. The Chromoscope: a Convenient Instrument for Studying the Color Sense of the Macula Lutea and its Anomalies. By Prof. **M. Knies,** Freiburg-in-Baden. Translated by Dr. WARD A. HOLDEN. (With three figures in the text) 485

4. On a Frequent but Hitherto Unrecognized Form of Congenital Violet-Blindness and on Color Anomalies in General. By Prof. **M. Knies,** Freiburg-in-Baden. Translated by Dr. WARD A. HOLDEN. (With four figures in the text) 491

5. On the Color Disturbance Produced by Santonin in Normal and Color-Blind Eyes. By Prof. **M. Knies,** Freiburg-in-Baden. Translated by Dr. WARD A. HOLDEN 503

6. Transfixion of the Iris. By Dr. **Hugo Aschheim.** Translated by Dr. WARD A. HOLDEN 507

7. The Examination of Two Cases of Old Specific Chorio-Retinitis. By Dr. **G. Nagel.** Translated by Dr. WARD A. HOLDEN. (With three figures on Plates XVIII.–XIX. of Vol. XXXVI., German Edition) 514

8. A Contribution to the Therapy and Prophylaxis of Expulsive Hemorrhage during Cataract Extraction. By Dr. **Carlo Peirone,** Turin. Slightly Abridged Translation by Dr. WARD A. HOLDEN. 521

9. Report of the Transactions of the Section of Ophthalmology and Otology at the New York Academy of Medicine, May 21, 1900. By Dr. **J. H. Claiborne,** Secretary 530

10. Report on the Section of Ophthalmology, British Medical Association. By **C. Devereux Marshall,** F.R.C.S. 538

11. Systematic Report on the Progress of Ophthalmology in the First Quarter of the Year 1900. By Dr. **St. Bernheimer,** in Vienna; Dr. **O. Brecht,** Prof. **R. Greeff,** Prof. **C. Horstmann,** and Dr. **R. Schweigger,** in Berlin. With the assistance of Dr. G. Abelsdorff, Berlin; Prof. E. Berger, Paris; Dr. Swan M. Burnett, Washington; Dr. Dalén, Stockholm; Dr. J. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. Krahnstöver, Rome; Mr. C. D. Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; Dr. C. H. A. Westhoff, Amsterdam; and others. Translated by Dr. WARD A. HOLDEN . . 548

A.—Prof. C. HORSTMANN. General ophthalmological literature, 548; General pathology, diagnosis, and therapeutics, 554; Instruments and remedies, 557. (*To be continued.*)

12. Book Reviews 561

XIII.—Der Pemphigus u. die essentielle Schrumpfung des Bindehaut (Pemphigus and the Essential Shrinkage of the Conjunctiva). By Dr. E. Franke.

XIV.—Die operative Beseitigung der durchsichtigen Linse (The Operative Removal of the Transparent Lens). By Dr. E. Pflüger.

XV.—Schädel und Auge (Skull and Eye). By Dr. Fritz Danziger.

XVI.—Physiologic Optics. By Dr. M. Tscherning, Paris. Translated by Carl Weiland, M.D., Philadelphia.

NUMBER 6.

PAGE

1. The Cause of a Special Form of Monocular Diplopia. By **Frederick Herman Verhoeff**, Ph.B., M.D. (With three illustrations) 565

2. On the Histology and Development of Lenticonus Posterior. By Dr. **S. Bäck.** Translated by Dr. WARD A. HOLDEN. (With three figures on Plate VI. of Vol. XXXVI., German Edition) . 573

3. On Elephantiasis Lymphangioides of the Lids. By Dr. **Giacomo Rombolotti,** Milan. Abridged Translation by Dr. WARD A. HOLDEN. (With four figures on Plates X.–XI. of Vol. XXXVI., German Edition, and one figure in the text) 578

4. On Accommodation in Aphakic Eyes. By Dr. **O. Walter,** Odessa. Translated by Dr. WARD A. HOLDEN 587

5. Remarks on Walter's Paper Entitled "Accommodation in Aphakic Eyes." By Dr. **Th. Lohnstein,** Berlin. Translated by Dr. WARD A. HOLDEN 600

6. Amaurotic Family Idiocy. By Dr. **Michael Mohr.** Abridged Translation by Dr. WARD A. HOLDEN. (With an ophthalmoscopic drawing on Plate XXIV. of Vol. XLI., German Edition, and three figures on Plate XXV.) 602

7. Congenital Double Paralysis of the Abducens and Facial Nerves. By Dr. **Eudoxius Procopovici.** Translated by Dr. MATTHIAS LANCKTON FOSTER, New York 619

8. An Iridectome, a New Instrument for the Performance of Iridectomy. By **Julius Wolff,** M.D., New York. (With a drawing) . 631

9. Systematic Report on the Progress of Ophthalmology in the First Quarter of the Year 1900. By Dr. **St. Bernheimer,** in Vienna; Dr. **O. Brecht,** Prof. **R. Greeff,** Prof. **C. Horstmann,** and Dr. **R. Schweigger,** in Berlin. With the Assistance of Dr. G. Abelsdorff, Berlin; Prof. E. Berger, Paris; Dr. Swan M. Burnett, Washington; Dr. Dalén, Stockholm; Dr. Herrnheiser, Prague; Prof. Hirschmann, Charkow; Dr. Krahnstöver, Rome; Mr. C. D. Marshall, London; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; Dr. C. H. A. Westhoff, Amsterdam; and others. Translated by Dr. WARD A. HOLDEN 636

A.—Dr. ABELSDORFF. Anatomy, 636; Physiology, 638; Refraction and accommodation, 640; Muscles and nerves, 642.

B.—Dr. SCHWEIGGER. Lids, 644; Lachrymal apparatus, 645; Orbit and neighboring cavities, 647; Conjunctiva, 651; Cornea, sclera, anterior chamber, 655.

C.—Dr. O. BRECHT. Lens, 656; Iris, 657; Choroid, 658; Vitreous, 660; Glaucoma, 660; Sympathetic ophthalmia, 661.

D.—Prof. GREEFF. Retina and functional disturbances, 662; Optic nerve, 665; Injuries, foreign bodies, parasites, 666; Ocular affections in general diseases, 667.

PAGE

10. Book Notices 671

XVII.—Injuries to the Eye in their Medico-Legal Aspect. By Dr. S. Baudry.

XVIII.—A Manual of Personal Hygiene. Edited by Walter L. Pyle, A.M., M.D.

11. Miscellaneous Notes 672

12. Index to Authors and Subjects of Vol. XXIX. 675

CONTENTS OF VOLUME XXIX., NUMBER 1.

PAGE

1. Double Nasal Hemianopsia Following a Fall on the Head. By **Swan M. Burnett,** M.D., Ph.D., Washington, D.C. (With four text illustrations) 1

2. Tuberculosis of the Conjunctiva. By **J. W. H. Eyre,** M.S., M.D. (With Plates IX. and X. of Vol. XL., German Edition) . . 12

3. The Successful Treatment of Three Important Cases of Disease of the Eyes by the Combined Method of HG and KI Internally and Pilocarpine Hypodermically. By **G. Herbert Burnham,** M.D., Tor.; F.R.C.S., Edin. 28

4. A Case of Extensive Detachment of the Retina in a Myopic Eye in which Complete Recovery Followed Rest in Bed and the Administration of Pilocarpine. By **Samuel Theobald,** M.D., Baltimore. (With a text illustration) 34

5. A Further Contribution to the Value of the X-Rays in Detecting Metallic Particles in the Eye, with Remarks on Other Methods. By **A. B. Kibbe,** M.D., Seattle, Washington 37

6. Treatment of Corneal Ulcers and Corneal Fistulæ by Electrolysis. By **Frank Cornwall,** M.D., San Francisco, Cal. 47

7. On the Injection of a Weak Sterile Solution of Sodium Chloride into Collapsed Eyes. By **Joseph A. Andrews,** M.D., New York. (With a text illustration) 50

8. Series of One Hundred Cases of Cataract Extraction. By Dr. **C. E. Finlay,** Havana, Cuba 54

9. A Case of Angioma Orbitæ Fibrosum. By Dr. **Ernst Neese,** Translated by Dr. WARD A. HOLDEN. (With three figures on Plate II. of Vol. XXXV., German Edition) 69

10. On Fibroma of the Corneal Limbus in Spring Catarrh. By Dr. **Hans Schlub.** Abridged Translation by Dr. WARD A. HOLDEN. (With five figures on Plate IV.–V. of Vol. XXXV., German Edition) 79

PAGE

11. On Twin Ganglion Cells in the Human Retina. By Prof. **R. Greeff,** Berlin. Abridged Translation by Dr. WARD A. HOLDEN. (With three figures on Plate VI. of Vol. XXXV., German Edition) 85

12. Case of Glioma Retinæ and Brain Metastases, with Autopsy and Review of Literature. By Dr. **F. M. Wilson,** Bridgeport, Conn., and Dr. **Edgar S. Thomson,** New York. (With text-plate I.) 91

13. Attempted Evulsion of Both Eyes by an Insane Patient. By Dr. **David Coggin,** Salem, Mass. 102

14. A Case of Congenital Irideremia. By **Royal S. Copeland,** A.M., M.D., Ann Arbor, Mich. 101

15. Report of the Section on Ophthalmology and Otology of the New York Academy of Medicine, October 16, 1899. By Dr. **J. Herbert Claiborne,** Secretary 103

16. Report on the Ninth International Ophthalmological Congress, Held at Utrecht, August 14–18, 1899. Conclusion. By Prof. **R. Greeff,** Berlin. Translated by Dr. WARD A. HOLDEN . . 109

17. Book Notices 138
I.—Refraction and How to Refract. By James Thorington, A.M., M.D.
II.—A Manual of the Diagnosis and Treatment of the Diseases of the Eye. By Edward Jackson.

18. Miscellaneous Notes 139

19. Contents of the Last Number of the *Archiv für Augenh.* . . 140

ARCHIVES OF OPHTHALMOLOGY.

DOUBLE NASAL HEMIANOPSIA FOLLOWING A FALL ON THE HEAD.

By SWAN M. BURNETT, M.D., Ph.D., Washington, D. C.

(With four text illustrations.)

IF we are to judge from our text-books and periodicals, nasal hemianopsia is a rare phenomenon.[1] Most of the treatises pass it over with a short paragraph; some of them do not mention it at all. Swanzy naïvely remarks: " . . . it is doubtful whether nasal hemianopsia has been really observed, although it has been described " (*Diseases of the Eye*, 1897). Panas, in his treatise published in 1894, says " up to this time not more than a dozen cases have been reported," and from the context we judge he questions the validity of some of these. Up to the present time, the most thorough study of the whole subject is to be found in Mauthner's classical treatise *Gehirn und Auge*, published in 1881. To this we shall have to refer later.

Most of the few cases that have been reported have been scanty in their history and observed generally for only a short length of time. The autopsies have been very limited in number, and in none has the connection between the phenomenon and the supposed cause been demonstrated to universal satisfaction. In the hope that a little light may be thrown upon an acknowledged obscure condition, there seems then hardly an excuse needed for reporting with considerable detail another case which has been under observation for three years.

[1] In the *Ophthalmic Review* for February, 1897, Dr. C. A. Veasy gives a bibliography of twenty cases in all, reported up to that date, in addition to his own.

Dr. G. W. C., a healthy-looking man, weighing one hundred and eighty pounds, aged forty, was first seen by me on the 12th of Feb., 1896. He related that nine days before, while returning from a visit to a patient at one o'clock in the morning, in alighting from a street car in motion he fell face foremost, striking his forehead against the ground. There was no unconsciousness at the time and, on recovering himself, he went at once to his house, a few blocks away, and applied hot fomentations to his forehead. On reaching his home, he noticed that vision in the right eye was obscured. There was also an ecchymosis of the conjunctiva which had disappeared when I saw him. His vision had never been

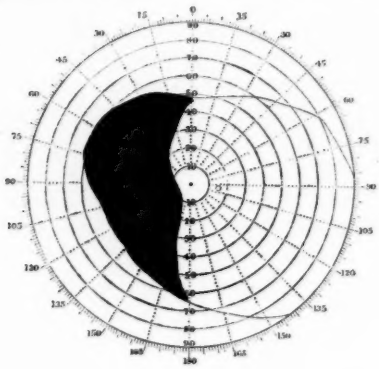


FIG. 1.
V. F. R. E., Feb. 15, 1896.

good and he has, since early manhood, worn on each eye strong convex glasses varying from + 6.5 to + 8. At this first examination the vision in the *right* eye was much reduced and the nasal half of the field was entirely lacking. The fundus of the left, uninjured, eye was not different from what might be a normal condition; its vision was, with the glasses he had been wearing, $\frac{5}{20}$, and was about the same as it had always been. The central vision in the right eye, with correction of ametropia, was not better than $\frac{5}{60}$, and there was a blur over all objects. An ophthalmoscopic examination showed the retinal veins tortuous and embedded in a swollen retina for some distance from the disk. The outline of the disk was indistinct. There were no hemorrhages and the m. l. was not noticeably changed. The visual field was not taken by the perimeter on this day, but was carefully mapped

out on the 15th and was as shown in the diagram (Fig. 1). On this date the central vision was clearer.

The condition as regards the swelling of the retina and the tortuosity of the veins gradually improved, but the disk began to assume a whiter hue, as compared with its fellow. The vision also gradually improved so that on the 22d of April it was $\frac{6}{24}$ with + 8. The hemianopsia, however, remained essentially the same. The field of vision was examined frequently, and while there were slight variations from time to time, they could very properly be referred to errors of observation. The line of demarcation was always practically vertical, passing near the point of fixation, to the outer side for about 5° or 10°, as is the case in typical hemianopsia. From this it has not deviated to this time.

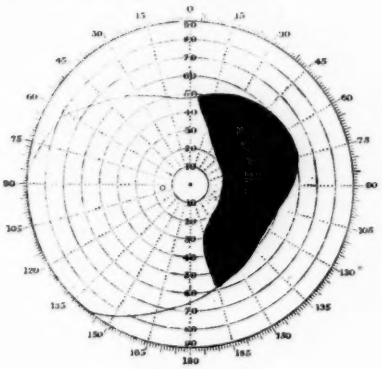


FIG. 2.
V. F. L. E., June 24, 1896.

Early in May, that is, about three months after the injury, he noticed that the *left* eye was failing and that with it objects had a yellow tinge. An examination made on the 11th of the month revealed a blurring of the edge of the disk, and an enlargement and tortuosity of the veins, just such as had been observed in the eye first affected. There were no hemorrhages in the retina. A nasal hemianopsia was found in this eye also, with its line of demarcation vertical, but less sharply marked, there being a narrow zone to the nasal side, in which there was still perception of light: The o. d. of the right, first affected, eye was much whiter. Condition otherwise unchanged. On the 14th, some small hemorrhages were seen near the disk in the left, down and in, the

direction in which the veins were most tortuous. On the 18th, the œdema of the retina had apparently increased, but the hemorrhages had disappeared. On the 30th, there was some perception of light in this eye for a few degrees toward the defective side of the visual field. June 13th: He has been suffering from intense headaches, mostly at the occiput, almost constantly for several weeks. The optic disk of the left, last affected, eye is getting whiter, and the vessels, particularly the veins, are diminishing in calibre. There are periods in which his vision generally seems to be worse. June 24th: Disk whiter and arteries so small that they can hardly be distinguished. The area of light perception had increased and the field at that time is shown in Fig. 2.

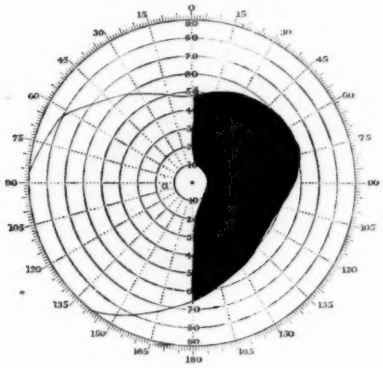


FIG. 3.
V. F. L. E., Sept. 1, 1897.

Up to July 24th there was little change in the condition of either eye. Both nerve heads are now perfectly white.

On the 21st of September he again presented himself with a complaint of headache which had been persistent for about thirty days. It was occipital as before. He always waked with it in the morning. His mental faculties are good. He sneezes a good deal, and there is a feeling of fulness in the soft palate and a watery discharge from the nose, especially the right nostril. The hemianopsic condition remains essentially the same. His vision is better in intense light. About this time he began to experience chromatopsic illusions. He would see banks of the most vividly colored flowers, whose hues were richer than anything he had ever seen before. These were most commonly seen on first

waking in the morning. These lasted several weeks and gradually wore away. The lacking portion of the field in the left eye is not uniformly dark, but there are islets in which some luminosity is apparent. The visual power in the clear portion is, however, still very low.

No change of importance was noted till Sept. 1, 1897, when he had an attack of rheumatism in the right foot, lasting for three weeks. The condition of the fields was about as at last report, the left free field being larger than the right, but the vision was still not above counting fingers at 2 metres. V. in the right $\frac{5}{20}$ with $+6.5$. Disks both white. On May 1, 1899, the date of the last examination, the left field had contracted to the limit shown in Fig. 3 and the defective portion was all dark. The field in the right eye was unchanged from that shown in Fig. 1. R. V. $= \frac{5}{20}$ with $+6.5$. L. fingers at 3 metres. Condition of fundus same as at last report. At no time has his urine, which was frequently examined, shown any material departure from the normal. No evidence of syphilis.

The exact etiology and precise location of the lesion of double nasal hemianopsia is still unsettled. There being a defect corresponding to the temporal halves of the two retinæ, if the cause is extra-ocular, there must be, in some way, an inhibitory influence on the nerve fibres connecting these lateral halves with the brain. The difficulty is in locating the seat of the lesion at some definite spot along the course of the fibres from the optic-nerve entrance to the ending of the tracts in the brain.

It is possible, among other conditions, to suppose that the pressure is exerted at the lamina cribrosa, or scleral ring, as in inflammations of the nerve head due to nephritis, brain tumor, or other cause. Mauthner is much inclined to this view, as the most nearly satisfactory explanation in the majority of cases reported up to the time of publication of his treatise in 1881. Even those cases of nasal hemianopsia associated with brain disease, he is disposed to regard as depending on the papillitis rather than on the cerebral lesion. Considering, however, the comparative frequency of papillitis, and the extreme rarity of the phenomenon of nasal hemianopsia, such a connection must be considered very improbable, especially in the absence of a demonstration

of such symmetrical localized pressure at the lamina cribrosa in any reported case.

A cerebral lesion is possible, and in a case reported by Daae (1870) a probable disturbance at the cerebral centres was the only assignable cause. The direct connection, however, was not revealed at the autopsy.

The only remaining likely determining agent is pressure either on the nerve trunks or the tracts. Knapp (1873) reported a case of double nasal hemianopsia in which there was found, on autopsy, an atheromatous degeneration of the circle of Willis, and a reduction of the art. communicans post. to hard cords which pressed upon both sides of the chiasma. Mauthner does not regard this explanation as convincing, because atheromatous conditions of that kind are not rare, while nasal hemianopsia is very uncommon. Plenk made perimetric examinations of a number of individuals from seventy to eighty-three years of age, in the greater number of whom the atheromatous condition of the vessels was very pronounced, and in no instance was any notable restriction of the visual field found. Our difficulties are much increased, in such cases as that now reported, by the

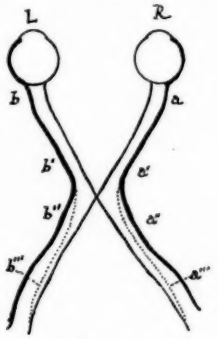


FIG. 4.

a a' a'' a''', *b b' b'' b'''* represent the presumed course of the uncrossed fibres.

necessity of having a doubly operating cause symmetrically placed so as to affect the temporal fibres only, leaving the others more or less intact. This is assuming, of course, that we accept the semi-dicussation theory, and that in the nerve

trunks at least, it is the lateral bundles that supply the temporal halves of the retinæ. In the scheme which has been commonly accepted, and which is found in all text-books (Fig. 4), pressure made simultaneously at the points *a b*, *a' b'*, *a'' b''*, would intercept impressions made on the temporal halves of the two retinæ on their way to the brain and thus give rise to the phenomena under consideration.

Such a peculiar concatenation of circumstances must be exceedingly rare as would lead to a single pathological lesion producing this effect. Writing in 1872, Mauthner announced that when a case of true nasal hemianopsia occurred, for so extraordinary a condition there must be an extraordinarily uncommon cause. Professor Schott reported in Knapp's ARCHIVES, 1877, a case which almost, but not exactly, fulfilled these requirements. An endothelioma was found pressing upon the right nerve on the inner side, reaching from near the optic-nerve entrance to the chiasma, while, on the other side, another tumor encroached on the left nerve to about the same extent, but obliquely, a part being on the outer side and a part on the upper surface. This, while indeed producing a nasal hemianopsia on the right side, would cause a temporal hemianopsia on the left side; in other words, a left-sided hemianopsia, but without sharply defined or typical limits. This case only shows that it is possible for two tumors to be pressing upon the two nerves simultaneously, and entirely independent of each other,—and there is, of course, always the possibility that sometimes it may happen that one of two tumors may affect the outer side of the right nerve, *a*, and another the outer side, *b* (Fig. 4), of the left nerve. Mauthner also suggests the possibility of a single tumor spanning the chiasma above or below, making pressure on both sides, at *a* and *b*, but leaving the surface between intact. It is of interest to note, however, in this connection, that so eminent an authority as Gowers should say: "I think that nasal hemianopsia has never been due to disease behind the chiasma, and I cannot conceive that it could be so produced." It will be thus seen how little of fact and how much of speculation has entered into the locating of the lesion in nasal hemianopsia.

Wilbrand, in summing up his brief consideration of nasal hemianopsia in the Norris and Oliver *System*, vol. ii., p. 272, says: "The cases of nasal hemianopsia described by other authors [aside from those published by Uhthoff in 1887, Knapp, 1873, and Henschen, 1890] seem to belong to symmetrical diseases of both optic nerves, because in none were found distinct lines of separation of the two halves of the fields."

Studying our own case then in the light of preceding cases and these varying opinions, where is the most likely seat of the lesion, or lesions?

Summarizing briefly the facts in the case we have: a fall on the forehead in a man over forty, with rupture of a conjunctival vessel of the right eye, and immediately a dimness of vision in the same eye. Nine days afterward there was found a clearly defined nasal hemianopsia, which has remained practically unchanged from that time till now, more than three years afterward. At the same time there was a marked, but not a profound, papillitis, which gradually went over into a distinct atrophy of the nerve head. Two months after the accident, and after the atrophy of the right nerve had set in, and without the occurrence of anything to which it could be referred, there was noticed a dimness of vision in the left eye, associated with a nasal hemianopsia and accompanied also by a papillitis of a medium grade. The course followed by the affection in this eye was essentially that of the other eye, except that the temporal half of the field in the left eye remained permanently and seriously impaired, while in the right the normal vision was restored in the free portion of the field.

Whatever else may have preceded or followed, we are forced to consider an optic neuritis as the essential pathological lesion. Whether that neuritis was limited to the nerve head (papillitis), or began behind the globe and travelled forward, it was not possible to determine, but it is a fact having an important bearing, that each eye, when first examined, very shortly after the trouble in vision was complained of, showed evidences of a papillitis, though not of a high degree. The connection between the fall and the

appearance of the trouble in the right eye almost immediately afterward can hardly be regarded in the light of a mere coincidence, and yet the defect in the left eye, which appeared some two months later, was not preceded by any such accident. Supposing, as would be the first thought, the lesion in the eye first affected to be a hemorrhage, to connect the trouble in the other eye with the same cause it would be necessary to assume that the hemorrhage, or some consequence of it, had slowly extended from the right to the left side. Unless the progress of the pressure followed a very circuitous route, the intervening tissues between the outer side of the right optic nerve and outer side of the left optic nerve would suffer, and the inevitable consequence must be a total blindness. In many of the cases reported, some such result, or an approach to it, has been the final outcome. That the pressure on the right side has remained limited strictly to the fibres going to the outer half of the retina, as in typical hemianopsia, is shown by the visual field (Fig. 1), which has remained practically unchanged for three years, and the free portion has retained its normal acuteness of vision. On the other hand, the visual field of the left eye does not present a picture of typical nasal hemianopsia, the dividing line running some 15° to the nasal side in some parts of its course (Fig. 2), and the free field has its normal visual acuteness very much reduced. The lesion in the left eye is, therefore, more extensive, and the nasal fibres of the nerve are affected as well as the temporal, though in a less degree.

Assuming then a blood-clot, or some pathological process set up by it, as the original cause, how could it operate to bring about the conditions as they exist to-day? So far as the right eye is concerned, the assumption is easily justified by accepting a clot on the outer side of the right nerve trunk making pressure which limits itself to the temporal-supplying fibres. This might be remarkable, but it is still possible. By what path, however, did this process pass over to the left nerve, leaving the nasal-supplying fibres intact in the right eye, on the supposition that the same cause did bring about the condition in both eyes? This

could be effected only by imagining the clot or inflammatory exudate passing from *a* or *a'* (Fig. 4), either above or below the right nerve trunk, traversing the intervening space without interfering with anything, and again appearing on the temporal side, at *b* or *b'*, on the left nerve. The tumor or exudate would have, under these circumstances, a form somewhat like this

, or this

. A lesion in the tract is possible, too, in spite of the opinion of Gowers, for while we do not know the exact path of the temporal-supplying fibres beyond the chiasma, it is generally conceded that they lie more dorsally than in the nerve trunks,[1] and we can easily see that a lesion at the dotted line *a'''* (Fig. 4), lying on the dorsum of the right tract and affecting the temporal fibres, which have here changed their position occupied at *a'*, could extend itself horizontally and finally affect the temporal fibres *b'''* in the left tract without necessarily interfering with the other fibres. It must be said, however, that against such a supposition must be brought the fact that there was no other manifestation of a cerebral lesion than the hemianopsia, barring the headaches. At no time was a paresis of any cranial nerve noted. Another fact which might militate against such a supposition is the very early appearance of the papillitis in each eye. It might be claimed, however, that this was intercurrent, and due to the gross lesion in the brain, and was independent of the retrobulbar neuritis, which was the real lesion in the hemianopsia. Certainly a neuritis no severer than in this case could hardly have produced the effects that followed. The papillitis was not localized to the temporal side, as we might properly expect it to be for the production of nasal hemianopsia, but general, as was the consequent atrophy.

It must be acknowledged that the direct connection of the phenomena in this case with a definite pathological state has not been clearly demonstrated, any more than in

[1] The latest researches of Dimmer (*Gräfe's Archiv*, B. xlviii., Ab. 3, 1899) confirm this in the main, though he finds an intermixture of the crossed and uncrossed fibres, apparently increasing as the central termination of the tracts is approached.

most of previously reported cases, but it is hoped that some of the facts and observations herewith presented may aid in a further, fuller study of an interesting subject.

Postscript.—After the manuscript of the foregoing paper was sent to the printer, the patient died, on October 15, 1899. He was taken with an attack of semi-unconsciousness on September 31st, followed by aphasia and agraphia, but no paralysis. From this he recovered, at least partially, and I saw him on October 9th, and examined the visual fields carefully, finding them approximately as at the examination in May. After this he had some general symptoms indicating a pyæmic condition, and an abscess in the perineal region developed. For this he was sent to Garfield Hospital by Dr. Hickling, his physician, for surgical treatment. He grew rapidly worse, his aphasia deepened, and he died apparently from a general pyæmic infection. To my profound regret I was not informed of his death, and most unfortunately no examination of the cranial cavity was made at the autopsy.

TUBERCULOSIS OF THE CONJUNCTIVA.

By J. W. H. EYRE, M.S., M.D.,

BACTERIOLOGIST TO CHARING CROSS HOSPITAL AND LECTURER ON BACTERIOLOGY IN THE MEDICAL SCHOOL; OPHTHALMIC SURGEON TO ST. MARY'S CHILDREN'S HOSPITAL; LATE SENIOR OPHTHALMIC ASSISTANT TO GUY'S HOSPITAL.

(*With Plates IX. and X. of Vol. XL., German Edition.*)

THE records of authenticated cases of tuberculosis of the conjunctiva are so few, and the total number of cases is stated to be so small, that additions thereto can hardly fail to be of interest.

Early observers, in blissful ignorance alike of the specific *causa causans* of tuberculosis and the pleomorphism of its resulting lesions, published but few cases of this nature; but since Koch's work on the tubercle bacillus, which among other points indicated the assistance the clinician might gain from the result of inoculation experiments in suitable animals, the list has expanded considerably — the great majority of the cases, however, being recorded by our German confrères.

The rarity of primary tuberculosis of the conjunctiva is now being less insisted upon, and I venture to assert that as more attention is directed to this condition, it will be found to occur fairly frequently.

In 1881 Hirschberg stated that the relative frequency of cases of tuberculosis of the conjunctiva to the total number of new cases was 1 : 6000. This, it must be remembered, was before the time that bacteriology was able to render any material aid to ophthalmology. A few years later (in 1885), when the extent — and limitations — of this aid was still only imperfectly realized, Mules put the ratio at 1 : 30,000.

From my own experience, both sets of figures would appear to err in making the condition a rarer one than is actually the case, for in 1897 I recorded 8 cases out of a total of 25,000 new patients.[1] To them I now propose to add 3, making a collection of 11 met with during the course of six years and out of a total number of 31,000 new cases (and I am quite prepared to believe that there have been one or two more that have escaped detection among the remaining 30,989), these figures giving us a ratio of about 1 : 2700. Moreover, as these figures reach a point where the "error of averages" tends to become a negligible quantity, the condition will probably be found to be even commoner than this ratio would indicate.

In view of these data, the scanty space devoted to this subject by most authors appears to me to be totally inadequate. For example, in the third volume of Norris and Oliver's *System*, tuberculosis of the conjunctiva is dismissed in about a page and a half, and mention is made of one only of the many well defined phases assumed by the disease.

Now Sattler, in 1891, carefully described no less than four groups of cases differentiated by broad clinical and macroscopical features. These he suggested might form the basis of a practical classification — a classification recapitulated below, with slight modifications; and opposite to each group I have placed a short note of its microscopical peculiarities.

GROUP I.

CLINICAL APPEARANCES.	MICROSCOPICAL APPEARANCES.
Characterized by the presence of one or more small miliary ulcers, which usually caseate, and may or may not coalesce; these generally attack the palpebral in preference to the bulbar conjunctiva.	Scrapings from these ulcers used to prepare cover-glass films and suitably stained, say by the Ziehl-Neelsen method, generally show numerous small groups or bunches of bacilli indistinguishable morphologically in their tinctorial reactions from the tubercle bacillus.

[1] Eyre, "Tuberculosis of the Conjunctiva," *Trans. of the Ophthalmological Soc. U. K.*, vol. xvii., 1897.

GROUP II.

Characterized by the presence of grayish or yellowish subconjunctival nodules, varying in size, but rarely larger than a hemp seed—resembling somewhat the sago granules of acute trachoma when gray; or the tubercles met with in the lungs of acute miliary tuberculosis when yellow is the prevailing tint. (I am satisfied in my own mind that this group is but the initial stage of the next, and that these small tubercles, increasing in size by a proliferation of the small round-celled exudation which encircles the giant-cell systems, absorb their conjunctival covering; the continued action of the central irritant is responded to by a like activity of the cell elements, and as growth tends to take place along the lines of least resistance, the fungating granulations of the IIId Group are the inevitable result.)

Sections of the small miliary tubercles show well-defined giant-cell systems (Fig. 1); and scattered here and there, without any definite arrangement or relationship to these giant cells, small groups of tubercle bacilli, seldom numbering more than ten or a dozen individuals, can usually be demonstrated.

GROUP III.

Characterized by the presence of florid hypertrophied papillæ and rounded flattened outgrowths of granulation tissue, sometimes

Sections of the hypertrophied papillæ and flattened granulations as a rule show nothing but masses of small round cells with occasional

derived from the tarsal conjunctiva, but usually springing from the fornices (resembling in many respects the velvety granulations met with in tuberculous arthritis), and associated with œdema and thickening of the lids.

large polygonal cells, but no definite giant-cell systems (Fig. 2). Tubercle bacilli are usually scattered but very sparsely throughout the tissue, and it generally happens that they are missed. In any case one must be prepared to examine scores of sections, and even then have to record a negative result.

GROUP IV.

Characterized by the presence of numerous pedunculated "cockscomb" excrescences in the fornices, of a jelly-like consistence, and often showing more or less extensive superficial ulceration.

Sections of the jelly-like masses occurring in this group consist, like the granulations of Group III, of masses of small round cells, but show in addition a large proportion of newly formed blood-vessels of the embryonic type (Fig. 3). As in Group III, it is difficult to demonstrate the tubercle bacillus in the sections.

GROUP V.

Characterized by the presence of a distinctly pedunculated tumor (very rarely, more than one may be present) having the macroscopical appearances of a papilloma or fibroma of the tarsal conjunctiva.

Sections of the tumor generally show a stroma of fairly dense connective tissue, enclosing a mass of round cells, with here and there giant-cell systems (Fig. 4); and in these systems, or in close proximity thereto, may be found tubercle bacilli, either isolated or in small bunches of five to ten individuals.

Hence it will be seen that a microscopical examination of the diseased tissue often affords but little help in diagnosis, and in such a case one must resort to an inoculation experiment for further assistance.

The animals usually selected for the purpose are the rabbit or the guinea-pig, and the seat of inoculation is either the subcutaneous tissue of the groin in the case of the latter animal; or the anterior chamber of the eye in the former.

Of the two animals the guinea-pig is generally conceded to be the more susceptible to the tubercle bacillus, dying of general tuberculosis some six, eight, or ten weeks after inoculation. On the other hand, if tuberculous material be introduced into the anterior chamber of a rabbit's eye, an iritis which is almost pathognomonic follows in from fourteen days to a month (see Fig. 7). The wide time limits, like those quoted in the case of the guinea-pig for death from general tuberculosis, depend upon two factors, the one, the virulence of the B. tuberculosis, the other the number of organisms introduced. In this connection I may mention the experiments of Wyssokowitsch, who (using tuberculosis sputum) found that the fewer organisms inoculated into a guinea-pig the longer the course of the disease before it was terminated by death; and also that if too few (less than 150) tubercle bacilli were inoculated into the rabbit, tuberculosis was not set up.

Now as the course and progress of a case of tuberculosis of the conjunctiva usually points to a strain of the tubercle bacillus of low virulence, and as one knows from microscopical examinations of material from such cases the bacilli are none too numerous, it follows that as large a piece as possible of the diseased conjunctiva should be used for inoculation purposes.

With these few preliminary remarks I will pass to the description of the three new cases.

Case 1.—Susan C——, aged seven, first came under observation Oct. 19, 1898, suffering from inflammation of the right eye.

History.—Father died a few weeks back of phthisis. Mother alive and well.

The grandmother states that the child has always been delicate

and ailing; that during the last six weeks the right upper eyelid has "drooped," the outer part of the lid has been swollen, and a little mattery discharge comes from the eye.

On Examination. General.—Patient is a fair, delicate looking child, not over-well nourished. Some bronchitis is present, but there is no evidence of tubercle of the lungs.

Local.—Right eye. There is a distinct thickening of the right upper eyelid, limited to its outer half, together with some ptosis which considerably decreases the size of the palpebral fissure; there is no pain or tenderness.

The right preauricular gland is swollen and hard, and shows as a distinct lump in front of the ear. The skin is not implicated and the gland is freely movable over the deeper structures. It is neither painful nor tender to the touch.

On everting the upper lid, the outer half of the conjunctival surface is seen to be much injected and of a livid hue. It is thickened and elevated from the presence of a small conjunctival nodule lying transversely to the direction of the Meibomian glands.

Scattered throughout this portion of the lid and contrasting with it in a striking manner are numerous yellow "pin's-point" specks.

The bulbar conjunctiva is unaffected; the cornea is normal. Left eye normal.

TREATMENT AND PROGRESS.

Oct. 19, 1898.—Ordered to bathe the eye with a simple boracic lotion, thrice daily. Ext. malti ferrati, ʒ i, ter die exhibited.

Oct. 27th.—The diffuse hyperæmia of the ocular aspect of the upper lid has given place to a localized circular patch about 4 *mm* in diameter, situated at the junction of the middle and outer thirds.

The preauricular gland appears to have increased in size, and the skin over it is somewhat reddened.

Nov. 2d.—Most of the yellowish points in the diseased conjunctiva have increased in size but even now do not attain a diameter of a millimetre. Ulceration of the conjunctiva has commenced in three separate spots—one in the centre of the injected area and the other two towards the lower part of its periphery.

Nov. 9th.—The three minute ulcers noted Nov. 2d have now coalesced and form a small circular ulcer, some 3 *mm* in diameter,

surrounded by a narrow hyperæmic zone. The edges of the ulcer are slightly everted and undermined, and the base shows numerous minute bright yellow dots, and readily exudes a sanious fluid when touched with a probe.

The preauricular gland is now tender to the touch.

Nov. 22d.—The patient was admitted into the St. Mary's Children's Hospital.

Nov. 23d.—A. C. E. was administered, and the ulcerating area and the tissue immediately surrounding it was thoroughly scraped with a small sharp spoon—at one spot at the centre almost the entire thickness of the tarsal cartilage being removed. The lid was then turned down, and a cold boracic compress applied for a few hours.

Nov. 27th.—The patient was discharged. The operation wound has practically granulated up, and looks well. Ordered to bathe the eye with lot. hydrarg. perchlor. (1 in 4000), three or four times a day.

Nov. 30th.—The site of the ulcer is slightly depressed, but otherwise appears normal.

The preauricular gland is less in size and no longer tender.

Dec. 14th.—The palpebral conjunctiva appears perfectly normal.

The preauricular gland of the right side is no longer to be seen or felt.

May 30th.—Eye remains normal.

BACTERIOLOGICAL EXAMINATION.

1. A coverslip film preparation was made from a portion of the scrapings from the ulcer. This, stained by the Ziehl-Neelsen method, exhibited numerous bacilli, morphologically identical with the tubercle bacillus, of fairly large size and having a moniliform appearance.

2. The remainder of the scrapings were introduced into the subcutaneous tissue of the groin of a young guinea-pig weighing 220 grammes. Five weeks later (Dec. 30th) the guinea-pig was dead; *post-mortem*, tubercle bacilli were found in a focus of suppuration at the seat of inoculation, and in the enlarged inguinal glands. Numerous small tubercles were also present in the omentum.

CASE 2.—Benjamin Y——, aged eighteen, clerk. First came under observation November 25, 1898, and was admitted to Guy's

Hospital two days later as suffering from tuberculosis of the conjunctiva.

History.—The family history is good. None of patient's relatives or friends suffer from consumption. Patient works eight to ten hours per diem in a small, badly ventilated office; one of his fellow-clerks suffers from a "winter cough."

Three weeks ago patient noticed that his right upper eyelid was swollen, and that he was unable to open the right eye to the same extent as the left; also that the sight of the left eye was failing.

Condition on Admission: General.—Patient is a tall, thin lad, far from robust-looking. Heart and other organs normal. No evidence of tubercle in the lungs.

Local.—Right eye. The upper lid is swollen and œdematous, pitting slightly on pressure, and the subciliary sulcus is obliterated. The cutaneous surface is of a dusky red color. The palpebral fissure, owing to the patient's inability to raise the lid, is distinctly reduced in size as compared with that of the other side.

The right preauricular gland is enlarged, hard, and firm; not adherent to the skin of the face, and freely movable over the deep structures; neither painful nor tender on pressure. One of the submaxillary glands, of the same side—that at the angle of the jaw—is also much enlarged.

On everting the upper lid, the conjunctiva is seen to be thickened and hyperæmic, and studded with numerous enlarged follicles of a purplish hue. The anterior edge of the retrotarsal fold shows numerous "warty-" looking masses of granulation tissue of fair size, the largest, situated about the middle, being about 5 *mm* in diameter. The granulations in this neighborhood are roughly circular in shape, with constricted bases and expanded, flattened summits—mushroom-shaped. The conjunctiva lining the upper fornix appears to be unaffected, beyond perhaps some slight engorgement of the vessels passing down on to the globe (Fig. 5).

The bulbar conjunctiva is practically normal, cornea unaffected. Vision = $\frac{6}{6}$. No hypermetropia.

$$\text{Left eye} \begin{cases} \text{Tissues normal.} \\ \text{Vision} = \frac{6}{36}\ \dot{c}\ \frac{+4\text{ D sph.}}{+1.5\text{ D cyl. ax. }125^\circ} = \frac{6}{12}\text{ pt.} \end{cases}$$

TREATMENT AND PROGRESS.

Nov. 27, 1898.—Immediately on admission, sol. cocainæ hydrochlor., 4 per cent., was instilled, and some of the prominent

granulations snipped off with curved scissors for microscopical examination. The eye was ordered to be bathed frequently with lot. acidi borici, and malt extract administered internally.

Dec. 1st.—A general anæsthetic was administered (A. C. E.). The right upper eyelid was everted and the retrotarsal fold excised in one piece, together with the narrow strip of conjunctiva covering the upper border of the tarsal cartilage which forms its anterior edge. No sutures were inserted; the lid was simply turned back and the eye closed by means of a pad and bandage.

Dec. 3d.—The pad and bandage were removed and a small eye-shade substituted. Patient had no pain though he complained of a feeling of stiffness when trying to move the lid or eye. Ordered to bathe the eye three times a day with lot. hydrarg. perchlor. (1 in 5000).

Dec. 7th.—Patient was discharged. The site of operation was marked only by a linear scar. There appeared to be no loss of mobility of the globe.

The preauricular gland was less in size and not so hard.

Dec. 20th.—Two small fleshy granulations have made their appearance, one at the middle and the other at the outer extremity of the scar.

Dec. 30th.—The granulations above mentioned, having increased in size, were removed to-day, under cocaine, by means of curved scissors, and the site of attachment of each scraped with a sharp spoon.

The preauricular gland could no longer be made out.

The submaxillary gland has also undergone resolution.

January, 1899.—No further trouble was experienced.

April, 1899.—Patient appears quite normal in respect to the affected eye.

BACTERIOLOGICAL EXAMINATION.

1. The small piece of granulation tissue removed on Nov. 27th was divided into two portions. (a) The one was fixed in a saturated solution of corrosive sublimate, hardened in alcohol, embedded in paraffin, and cut in serial sections in a plane vertical to the bulk of the granulation. Some twenty of these serial sections were mounted on each of twelve slides and stained for tubercle bacilli. On one slide a small bunch of perhaps ten bacilli was found; two or three isolated bacilli were all that were seen in the remainder of the

slides. On staining with borax carmine and picronigrosin, the tissue was found to consist for the most part of masses of small round cells and developing blood-vessels, with an occasional giant cell, and a few definite tubercle systems.

2. The remainder of the tissue was introduced into the subcutaneous tissue of the groin of a 300-gramme guinea-pig. On Jan. 10, 1899 (six weeks after inoculation), the animal was found to be dead. It weighed barely 100 grammes, and *post-mortem* presented a typical picture of general tuberculosis.

3. A piece of granulation tissue removed on Dec. 1st (practically half of one of the largest "mushroom" granulations, and about equivalent to a two-millimetre cube) was thoroughly washed in several changes of sterile broth. A. C. E. was administered to a large rabbit (weighing some 2000 grammes), and after flushing out the conjunctival sac with sterile salt solution for some five minutes, a linear incision was made in the upper part of the periphery of the right cornea with a triangular keratome, and the iris incised whilst in the act of withdrawing the knife. The diseased tissue was now introduced through the corneal wound and allowed to rest over the wound in the iris. The conjunctival sac was again thoroughly washed out. Two days later the lips of the corneal incision had united, there was practically no conjunctival injection, and the anterior chamber had reformed. A certain amount of exudation had taken place from the wounded iris, binding the piece of granulation tissue, which was now quite white, firmly down to that membrane. During the following week absorption of the foreign mass proceeded apace. On the ninth day after inoculation, however, a marked circumcorneal zone of injection was present, the iris was muddy and inactive, and the fundus reflex was dull. The mass of tissue in the anterior chamber was pinkish in color and new vessels could be made out on its anterior surface. Two days later the animal was killed with $CHCl_3$, the affected eye excised, frozen, and bisected vertically in its antero-posterior axis so that the section passed through the centre of the foreign tissue. One half was mounted in gelatin, the other prepared for

microscopical examination. *Post-mortem*,—a caseous gland was found in the right side of the neck which contained a few tubercle bacilli.

Microscopical examination of the sections prepared from the rabbit's eye showed that the adventitious tissue had become blended with the anterior surface of the iris. The central portion formed a roughly circular nucleus of dense fibrous tissue whilst the entire periphery was infiltrated with small round cells; and here and there the formation of elementary "giant-cell systems" could be observed. The search for tubercle bacilli gave a negative result. It would therefore appear that owing to a mistaken idea as to the severity of the condition of the eye, the animal was killed too early.

CASE 3.[1]—Percy L——, aged fourteen. First came under observation on Feb. 3, 1899. Patient was then in one of the general surgical wards of Guy's Hospital, having been sent in for treatment of suppurating glands of the left side of the face and neck. A fortnight later he was transferred to the eye wards for (?) tuberculosis of the conjunctiva.

History.—The family history is good. Both parents alive and healthy; ditto brothers and sisters. No history of phthisis. Three months ago patient noticed a small swelling in front of the left ear; one month later another appeared just below the angle of the jaw on the same side. (A little before the first appeared patient says that his right eye was noticed to be swollen, but this quickly passed off.) Patient was taken to the family doctor, who opened the tumor in front of the ear, and let out some "thick yellow stuff." As the wound thus made did not close, but continued to discharge, and the second swelling "burst," patient was sent up to the hospital.

TREATMENT AND PROGRESS.

Feb. 3, 1899.—A. C. E. was administered and the cavity caused by the suppurating preauricular gland thoroughly scraped, the infiltrated skin around the opening excised, and the wound closed by continuous horsehair sutures. The gland below the jaw was

[1] I am indebted to Dr. Brailey for permission to report this case in its entirety.—J. E.

dissected out and this wound similarly closed. Both were dressed with carbolic gauze.

Feb. 6th.—Wounds dressed; incisions are healing although there is some discharge from each. The left eye was examined and granular conjunctivitis—trachoma—diagnosed.

Feb. 9th.—Wound below jaw healed but that in front of the ear still discharging. All stitches removed. (The preceding notes were abstracted from the Surgical Clerk's Report.)

Feb. 16th.—Patient transferred to the eye wards.

Condition on Admission: General.—Patient is a pale, weakly looking lad, although fairly well nourished. No evidence of tubercle in the lungs or elsewhere.

Local.—Left eye. Both lids pallid—slightly thickened but not œdematous.

On drawing down the lower lid, many small yellow nodules are seen scattered over the palpebral conjunctiva and a few grayish ones, chiefly to the outer side, and especially aggregated towards the outer canthus. Whilst the yellowish dots are precisely similar to these seen in acute miliary tuberculosis of the lung, the gray ones more nearly resemble the discrete granules of an early trachoma.

On everting the upper lid, numerous small red "mushroom" or "button" granulations, slightly constricted at their bases, are noticed arranged in a line over the upper edge of the tarsal cartilage. The largest of these is perhaps 4 or 5 *mm* in its longest diameter. Towards the outer angle may be noticed several of the yellowish tubercles, similar to those in the conjunctiva of the lower lid (Fig. 6). The vessels of the bulbar conjunctiva are but slightly injected. Cornea normal. The situation of the preauricular gland is marked by a small circular sinus, some 8 *mm* in diameter, which is suppurating profusely.

Feb. 17th.—Under cocaine, two contiguous yellow nodules were removed from the conjunctiva of the lower lid, for bacteriological examination.

Feb. 24th.—A. C. E. was administered. The lids were everted and all the prominent nodules and granulations removed by the aid of curved scissors. Next, their bases and the surrounding portions of the conjunctiva were thoroughly scraped with a sharp spoon, the lids replaced, and the eye bandaged for a few hours.

March 3d.—Two small granulations have sprung up at the outer part of the conjunctival surface of the upper lid. These were completely removed under cocaine.

Patient discharged.

March 8th.—The inner surface of each lid appears to be invested by normal conjunctiva—a good example of the vitality of this membrane, and its remarkable powers of regeneration even after the destruction of large areas.

The preauricular sinus has completely healed.

May, 1899.—Patient remains perfectly well.

BACTERIOLOGICAL EXAMINATION.

1. The scrapings and granulations removed by the operation on Feb. 24th were carefully preserved, thoroughly washed in warm sterile broth, then fixed in corrosive solution, hardened in alcohol, and embedded in paraffin in one mass. Sections were cut and mounted serially, and stained for tubercle bacilli, but although I examined considerably over a score of slides, each having 4–8 serial sections mounted thereon, I was unable to satisfy myself as to the presence of the tubercle bacillus. Stained with borax carmine and picronigrosin, the small nodules had each the structure of a typical miliary tubercle, with central giant cells.

2. A rabbit weighing 1270 grammes was anæsthetized by means of A. C. E., and incision made with a triangular keratome in the upper corneal margin of the right eye; next a small triangular piece of iris was excised, midway between the free and attached margins.

The tubercles removed from the conjunctiva (Feb. 17th) were introduced through the corneal incision, and, with a fine pair of forceps, passed through the wound in the iris into the chamber existing behind the base of the iris, and between it and the anterior surface of the lens, and pushed a little to the temporal side of the orifice so that it should not fall forwards into the anterior chamber of the eye. The entire operation was conducted with strict regard to asepsis, and was completed within thirty minutes of the removal of the tissue from the patient's conjunctiva, the nodules being placed during the preliminary steps in a capsule containing sterile broth at the temperature of the body.

Two days later the eye is noted as quite quiet, the corneal incision closed, and the orifice in the iris occluded by lymph.

The position of the piece of (?) tuberculous conjunctiva is indicated by a slight bulging forwards of the iris, to the nasal side of the patch of lymph.

During the next month but little change took place locally, although the animal steadily declined in weight until by the 5th of April (just over six weeks from the time of inoculation) it had lost 195 grammes. On this day also the iris was first noticed to be muddy and injected, and three minute yellow spots were detected on the pupillary margin of the iris.

On April 11th, the cornea is uniformly hazy, and in consequence the fundus reflex is dull. The whole iris is puckered up into ridges and furrows, radiating from the pupil. The three minute tubercles noted five days ago have increased to nearly double their previous size, and in addition, a large nodular mass occupies the nasal half of the posterior surface of the iris, and shows yellow through that organ (Fig. 7).

April 13th.—The animal to-day weighed but 1000 grammes. It was killed with $CHCl_3$, the right eye excised, bisected horizontally through its antero-posterior axis, the section passing through the large yellow mass; one half was mounted in gelatin, the other prepared for microscopical sections.

Post-mortem.—The emaciation, the glandular enlargement, the presence of tubercle bacilli in the glands of the neck and axilla (which were all that were examined microscopically), and the caseous nodules in the spleen made up an absolutely typical picture of general tuberculosis.

Microscopical examination of the sections prepared from the rabbit's eye showed that each of the small yellowish dots noted during life had the structure of a typical tubercle with its central giant cell or cells surrounded by zones of epithelioid and lymphoid cells; tubercle bacilli could also be detected in and near the giant cells.

The large yellow mass which formed an integral portion of the base of the iris was also tuberculous in character, and showed signs of commencing caseation at its centre. Infiltration of the ciliary body by small round cells was in active progress, and tubercle bacilli were plentiful throughout the entire mass.

CONCLUSIONS.

1. Cases of primary tuberculosis of the conjunctiva occur in the proportion of at least 1:2700; probably more frequently.

2. Primary tuberculosis of the conjunctiva is usually unilateral.

3. It occurs either as a caseating ulcer, or as an inflammatory new formation of the granuloma type—if as the latter it belongs to one or other of four clinically distinct groups.

4. It is extremely chronic, and exhibits no tendency to undergo spontaneous cure.

5. It does not usually tend to implicate the cornea until quite late in the disease, and the iris later still.

6. The preauricular gland of the same side as the affected eye is infected early, and then the next glands in the series, viz., those below the angle of the jaw.

7. If untreated, the conjunctival lesion will probably serve as the primary focus from which the bacillus tuberculosis will become disseminated to distant organs.

8. Removal should be thorough, and should be undertaken as early as possible. Under such circumstances, like other localized tuberculous lesions, a permanent cure may be confidently expected.

9. With regard to the microscopy of the disease, in the case of the ulcer, tubercle bacilli can generally be demonstrated by suitable means in the "scrapings"; but where the lesion is of the nature of a granuloma, it is rather the exception than the rule to detect the organisms in sections of the tissues, but in such cases the experimental inoculation of a portion of the diseased tissue into the anterior chamber of a rabbit's eye or the subcutaneous tissue of a guinea-pig will rarely fail to prove a positive result (so far in my hands this method of diagnosis has never failed).

Plate I.

FIG. 1.—Section of conjunctival tubercle (Group II.), with central giant cells—$\frac{1}{6}$ in. objective, and 8 ocular.

FIG. 2.—Section of granulation tissue outgrowths (Group III.),

showing small round cells and few polygonal cells—$\frac{1}{4}$ in. objective, and 6 ocular.

FIG. 3.—Section of gelatinous "cockscomb" excrescences (Group IV.), showing small round cells, and numerous embryonic type blood-vessels—$\frac{1}{4}$ in. objective, and 4 ocular.

FIG. 4.—Section of conjunctival tumor (Group V.), showing the small cells in fibrous stroma; also giant-cell systems towards the free edge—$\frac{1}{4}$ in. objective, and 6 ocular.

Plate II.

FIG. 5.—Tuberculosis of the conjunctiva, Group III. (See Case 2, Benjamin Y——.)

FIG. 6.—Tuberculosis of the conjunctiva, Groups II. and III. (See Case 3, Percy L——.) Note the unusual combination of the miliary tubercles of Group II. in the lower lid, with the fungating granulations so characteristic of Group III. in the upper.

FIG. 7.—Tuberculous iritis in the rabbit—resulting from the inoculation of a portion of the diseased conjunctiva from Case 3.

I am indebted to the facile brush of my friend, Dr. T. G. Stevens, of Guy's Hospital, for the faithful, and at the same time artistic, representations of the clinical appearances contained in these last three figures.

THE SUCCESSFUL TREATMENT OF THREE IMPORTANT CASES OF DISEASE OF THE EYES BY THE COMBINED METHOD OF HG AND KI INTERNALLY AND PILOCARPINE HYPODERMICALLY.[1]

By G. HERBERT BURNHAM, M.D., Tor.; F.R.C.S., Edin.;

ASSOCIATE PROFESSOR OF OPHTHALMOLOGY AND OTOLOGY, TORONTO UNIVERSITY; OCULIST AND AURIST TO THE GENERAL HOSPITAL, TORONTO, ETC.

IT is my intention particularly to mention three cases,—one of cyclo-iritis of both eyes, of long duration, with the other changes in the eyes usually associated with the long continuance of this disease; a second of iritis of both eyes, with typical diffuse scleroderma; and a third of complete paralysis of the left third nerve, from acquired specific disease.

These I bring forward as exemplifications in a most marked degree of the great value of my combined form of treatment, viz., mercury and the iodide of potash given internally and pilocarpine hypodermically.[2] To these I could add minor cases. At present I have just received under my care a very severe case of rheumatic cyclo-iritis of each eye with vision, good perception of light only; also a case of inflammation of the ciliary region, retina, choroid, vitreous, leading to almost total destruction of vision of one eye and less, though marked, affection of the same structures of the other. This has been caused by masturbation, practised a good many years by a young man, twenty-six years of age. I have also another of acquired specific iritis of both eyes;

[1] Read before the Canadian Medical Association, at Toronto, Aug. 31, 1899.

[2] See Arch. of Ophthal., xxvii., p. 175.

one, the right, made a permanent recovery; but the left has had for one year or more frequent relapses, thus preventing the man from returning to his employment. The pupil is unable to dilate fully, owing to iritic adhesions. He is now for the first time under my care, and I am using my combined treatment for the sole purpose of putting a stop to these relapses, which I am fully persuaded it will.

CHRONIC IRIDO-CYCLITIS.

My **first case** is an unmarried woman, fifty-eight years of age. The family history seems to be fairly good. In the spring of 1896, the R eye became inflamed for one week. It then became quite quiet, but at the end of one month the left eye became inflamed, and has had similar attacks on and off ever since. The R eye had also during this time suffered, but not nearly so severely.

She consulted a specialist in the spring of 1897. He used my combined form of treatment for seven injections. The eyes were quieter that summer. In the winter, 1897–98, there were, on and off, severe attacks of inflammation. In the summer, 1898, thirty injections of pilocarpine were given. During these injections she had, she said, several attacks of inflammation of the eyes.

With my experience regarding this case, the combined treatment, then tried, failed because it was wrongly given. She continued the use of internal remedies till November, 1898, when she consulted me for the first time. The condition was then as follows:

Left eye: no perception of light, T −, very shallow anterior chamber, and the tissue of the iris infiltrated and covered with a dull whitish exudation, which also involved the pupillary area, so that no details of the tissue of the iris and the pupillary area could be made out—that is, a dull grayish, homogeneous mass covered entirely the iris and pupillary area.

Right V = less than $\frac{20}{200}$, T +, halos at times, pupil contracted and margins held by fine exudation. A dull, white patch of exudation showed in the pupil and reached down behind the iris, apparently unattached to the pupillary margin; at the upper margin the same condition, but the exudation smaller in size.

My combined form of treatment was begun at the end of the

first week in November, 1898. Fifteen hypodermic injections of pilocarpine were given.

December 16, 1898.—R V = $\frac{20}{200}$ and $\frac{20}{100}$; she says the sight is clearer and the halos are less marked; Tn. full.

February 2, 1899.—Returned for another series of injections. R V = $\frac{20}{100}$. The injections were begun but discontinued in a few days as a very severe attack of follicular tonsilitis set in. R eye at once became painful and a little injected, T +, and the two patches of dull, whitish exudation before mentioned came out from behind the iris and passing through the pupil lay in the anterior chamber well down in front of the iris, but still attached at one end behind the iris. This attack, the only one experienced since the beginning of my treatment, lasted but a few hours. With its cessation the lymph patches again went back into their former position and the eye became quiet. This short-lived attack has been the only one up to the present time, that is, August, 1899, and seems in some way to have been connected with the tonsilitis.

May 27th.—R eye V = $\frac{20}{40}$ less one letter, Tn.

L Tn. full, no p. l.

Now the iris tissue can, for the first time, be seen in some places. Where previously a uniform grayish membrane only could be made out, now the tissue of the iris can be distinctly seen.

She returned August 7, 1899, for another series of injections.

R eye V = $\frac{20}{40}$, Tn.; eye quiet since her last visit.

L Tn., no p. l. The clearing-up process still progresses most satisfactorily.

This left eye will, of course, never regain perception of light, but the unmistakable evidence of improvement in this lost, degenerated eye again puts beyond dispute the radical and far-reaching effect of this treatment. With respect to this case I was more sceptical regarding the results to be got from my treatment than any other I had yet met with. However, the treatment is having a most beneficial effect, and pursuing exactly the same course for the next two, three, or four years, I expect to be able to chronicle another decided success.

My **second,** a man, a Jew, William D., aged forty-eight years, is a most typical case of advanced diffuse *scleroderma with iritis in*

each eye. The iritis was marked by fine posterior synechias and a thin covering of lymph on the anterior capsule of the lens. The sight was very poor.

He was put under my combined form of treatment the latter part of December, 1898. At present the iritis is very much improved, and the vision decidedly better. As to the scleroderma, in that there has been a steady, uninterrupted change for the better, till now it has reached a stage of improvement which forms a most striking contrast to the pitiable and apparently hopeless condition he was in when I began. This patient is shown in the skin clinic organized in connection with this meeting and held in St. Michael's Hospital, so that you all can see him. I may mention that I have been informed that previously this patient had been an inmate of some of the most prominent hospitals in the United States. I would like the treatment to be tried in lupus and kindred affections.

My **third case** is of a different type. The specific disease was contracted four years ago and was under treatment for some time.

For about nine months before consulting me the iodide of potash was given. At the end of this time there came this total paralysis of the left third nerve. The patient went to bed apparently in the usual good health. In the morning on arising the eye felt queer, and by nightfall the paralysis, from what I learn, was complete.

At the end of one week I was consulted. After a delay of two weeks I began my combined treatment. I gave fourteen hypodermic injections. At the end of the twelfth, that is, at the end of thirteen days, there was an increase in the movement upwards of the eyelid and a slight movement inwards of the eyeball. One week later, the injections being now stopped, the eyelid could be raised a full two-thirds of the normal amount and the eyeball could be brought to the median line and held there. Three weeks after the first, the second series of injections, seven in number, were given. Diplopia is at six feet. At any greater distance the vision is single. Three weeks later there remained only a very slight drooping of the eyelid, and the patient could walk comfortably with both eyes open, up to this time being unable to do so on account of the confusion of images. Two weeks later diplopia is not now made out till the object is at the distance of ten inches. The progress after the use of my combined treatment I consider most rapid, viz., in eight weeks from the beginning of this treatment

no diplopia till the distance of ten inches from the eyes was reached. I have no notes since that date, that is, six weeks ago, as the patient has not put in an appearance.

As to the method of administration, my previous articles have, I think, fully dealt with that. I shall only say, tuck well in the bed-clothes along the whole spine from the occiput downwards; and in cool or cold weather put a hot bottle to the feet. Two symptoms of a proper effect are very free perspiration and the free flow of saliva, viz., six fluid ounces to one pint. As to the length of time to continue these recurring series, I name no special limit, but do always advise to go on as long as there is any improvement. In my minor and easily managed cases a few months will suffice, whereas in my severe ones I have continued them for three or four years.

There is one peculiarity in this treatment,—that is, that no relapses occur, even in cases in which under the forms of treatment previously used they have recurred frequently and severely. The nerve centres, especially what we term the absorptive system, are most profoundly and directly acted upon in this treatment. Especially marked is this stimulated condition of the nerve centres during the first few hours after the injection. Hence the great necessity of exercising the care I am ever insisting upon.

Having thus been able to produce the effect upon the diseased tissues which I have drawn attention to, it follows that to keep up the desired action we must go on using the remedies, and hence the consistency of advocating their methodical administration, and in severe cases their long-continued use.

In cases of old iritis where there is much damage to the vision through the effusion and organization of lymph, I never do an iridectomy. Instead I cause its absorption by my method with far better vision than by any other procedure, operative or otherwise. In my earliest papers I said that any other organ or part of the body ought to be as easily influenced by this treatment as the eye. This case of iritis with diffuse scleroderma most satisfactorily emphasizes and bears out this contention of mine. It ought to

encourage the members of the profession to give my treatment a fair and impartial trial.

In the eye minute changes for the better can very quickly be seen, whereas if the eye were much less easy of observation, a much longer time for the recognition of an improvement would be needed. This must not be forgotten when my treatment is applied to other organs not so easily observed as the eye. Hence patience must then be exercised, as an improvement may sometimes have been going on for quite a length of time before the observer has the changed condition drawn to his attention. This combined form of treatment applies equally to *syphilitic* and *non-syphilitic* affections.

After the many years of close observation regarding this treatment, I now feel that I can, and have a right to, speak emphatically as to its assured, and I might almost say unique, position.

A CASE OF EXTENSIVE DETACHMENT OF THE RETINA IN A MYOPIC EYE IN WHICH COMPLETE RECOVERY FOLLOWED REST IN BED AND THE ADMINISTRATION OF PILOCARPINE.

By SAMUEL THEOBALD, M.D., Baltimore.

Clinical Professor of Ophthalmology and Otology, Johns Hopkins University.

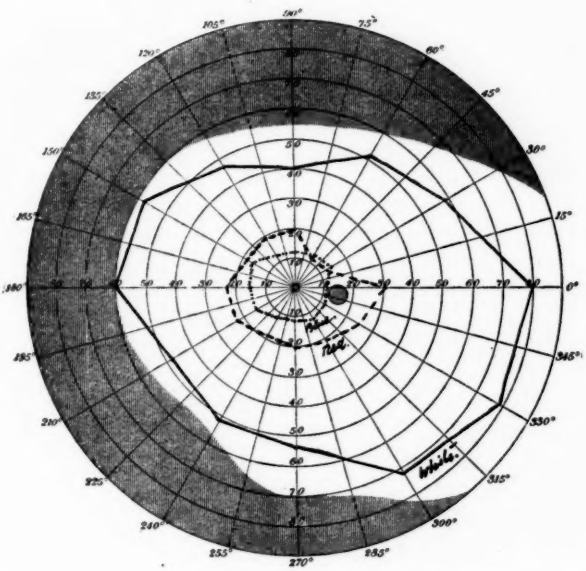
(*With a text illustration.*)

NOTWITHSTANDING the rather extravagant claims which have recently been put forth as to the success obtained in the treatment of detachment of the retina by operative procedures more or less novel, it may still be held, I think, that complete recoveries from this very grave condition, especially recoveries occurring in highly myopic eyes, are sufficiently rare to justify one in reporting even a single case of this character.

By way of preface, I may remark that it is not claimed that the successful outcome of the case which I purpose briefly describing was necessarily a *consequence* of the treatment adopted. Probably it was; but we should not lose sight of the fact, generally recognized, that spontaneous recoveries are met with from time to time. If there is any lesson to be drawn from the case, it is the importance of commencing the treatment of retinal detachments at the earliest possible moment.

A point of interest is the remarkable change which occurred in the refraction of the eye during the stage of reattachment of the retina. There is good reason to believe that before the occurrence of the detachment there was a myopia in this eye of 7.50 to 8. D. At one period during

the convalescence, when central V had reached $\frac{10}{LXXV}$, there was a manifest hypermetropia of 4. D (a + 4. s lens actually giving the best obtainable vision), indicating a shortening of the distance between the cornea and the retina in the region of the macula of approximately $3\frac{1}{2}$ *mm.* This condition, as might be supposed, was a transient one, and as the



retina became more closely applied to the other coats of the eye the myopia returned, and gradually increased to 4.D and later to 5.50 D.

Summarized as briefly as possible, the history of the case is as follows:

L. A. H, æt. fifty, American, accountant, was first seen at the Baltimore Eye, Ear, and Throat Charity Hospital, May 20, 1898. Four days previously, upon awakening in the morning, he had observed a marked defect in the vision of the right eye, before which eye, a week earlier, he had noticed floating motes. There was no history of traumatism. The ophthalmoscope showed extensive detachment of the retina, the detachment being especially

marked upwards and outwards and being so extensive as to preclude a view of the papilla. Vision was reduced to mere ability to detect movements of the hand in the upper and outer portion of the field, central vision being practically nil. Pilocarpine muriate was prescribed, to be taken by the mouth, in increasing daily doses, beginning with gr. $\frac{1}{4}$. Five days later the patient was taken into the hospital, where he was kept for five weeks, being confined to bed for the first two weeks of his stay. The administration of the pilocarpine was continued for two weeks after his admission to the hospital, the maximum dose reached being half a grain once a day. At the time of his discharge the retinal detachment had diminished markedly and he had $V = \frac{10}{LXXV}$, with central fixation. A week later (July 6th) he was put upon small doses (gr. v. three times a day) of potassium iodide, which were continued regularly for four weeks, and afterwards, at intervals, for some weeks longer. August 24th, a careful ophthalmoscopic examination revealed no detachment of the retina, but showed, what had previously been noted, a rather large floating opacity in the posterior portion of the vitreous humor. The vision of this eye had now improved to $\frac{20}{XC}$ with — 2.50 s. October 14th, the myopia had increased to 4.D and the vision had improved to $\frac{20}{LXX}$. April 23, 1899, a test of the vision showed a further slight improvement ($\frac{20}{LX}$—) and indicated a M = 5.25 D. The accompanying chart shows the field of vision taken at this date. The color fields, which are noteworthy because of their limited area, especially the field for blue, were taken one week later. The vision was tested last on June 30, 1899, and was then $\frac{20}{LX}$ + with — 5.50 s, and the visual field was rather better than when taken in April.

A recent ophthalmoscopic examination (Oct. 25th) showed no trace of the former detachment. The floating vitreous opacity was still present, but beside this there were only the appearances characteristic of a decidedly myopic eye—a conus of moderate size with general thinning of the choroido-retinal pigment.

He is now, and has been for some time, using his eyes moderately in near work and experiences no especial inconvenience; and, as more than fourteen months have elapsed since the retina became reattached, the prognosis as to the future is, I think, distinctly favorable.

A FURTHER CONTRIBUTION TO THE VALUE OF THE X-RAYS IN DETECTING METALLIC PARTICLES IN THE EYE, WITH REMARKS ON OTHER METHODS.

By A. B. KIBBE, M.D., Seattle, Washington.

IN a previous article,[1] I reported a number of cases in which the X-rays had been of great value in locating particles of iron within the eyeball. Since that time, enlarged experience with the method has served to strengthen my belief in its value, and I now beg leave to add to the number then reported several more, and to make a critical comparison of this method with others more or less in common use.

Case 1.—R. E. H., farmer, consulted me September 16, 1897. Ten weeks previously, while hammering a piece of iron, a particle flew from the hammer and struck his right eye; vision gradually failed, until at the time of visit it was reduced to perception of light. Examination showed an opaque lens, closed pupil, and subsiding iritis. Faint cicatrix near the upper edge of cornea. Radiograph shows foreign body in upper anterior half of globe. Under anæsthesia lens was removed after making a wide iridectomy. Tip of magnet introduced into anterior chamber failed to withdraw the particle. Recovery with thick opaque capsule in pupillary area. Eye free from irritation. No tenderness in ciliary region. Second radiograph shows foreign body in same location. Returned three months later with eye still in good condition. Patient was informed of probable final outcome, but was willing to take all responsibility and retain the eye as long as possible.

Case 2.—Geo. C. consulted me October 18, 1897. Left eye

[1] These Archives, vol. xxvi., No. 4.

was injured ten days before by particle flying from iron wedge which he was driving into a log. Lens opaque. Iritis, complete closure of pupil, slight exudate in bottom of anterior chamber, faint linear scar midway between centre and lower edge of cornea. Radiograph shows foreign body in either lower part of anterior chamber or anterior portion of lens and close to limbus. Anæsthesia, incision at limbus inferiorly. On introducing tip of magnet, a click was heard and a small particle of steel removed. An iridectomy was made and softened lens removed as far as possible. Ten days later, patient, who was very unruly and disagreeable, left the hospital. Not seen again.

The two following cases are examples of the absence of foreign bodies, when their presence might readily have been suspected.

Case 3.—C. W. S. was brought to my office by his brother in the evening of October 26, 1897. He had been struck in the left eye the previous day by a piece of iron flying from a casting which he was hammering. Examination showed a horizontal wound in the upper portion of the cornea four millimetres in length. Anterior chamber filled with blood. He had no idea of the size of the piece which had struck the eye, but thought it must have been a large one. A radiograph was at once taken, which showed the absence of any metallic particle. The eye was dressed antiseptically, the patient sent to the hospital and ordered to remain in bed. A week later, the blood having been absorbed from the anterior chamber, and the lens being swollen with particles protruding into the anterior chamber, linear extraction was performed. Recovery uneventful.

Case 4.—W. G. W., machinist, consulted me March 8, 1898. While cutting an iron rod with a cold-chisel, twenty-four hours previously, a piece flew and injured his right eye. Vertical wound about five millimetres in length near temporal edge of cornea, anterior chamber filled with blood. Radiograph gave negative result. Eye washed with hot boracic acid solution, lids cleansed, and aseptic dressing applied. Recovery with vision $\frac{20}{40}$.

Case 5.—W. J. B., April 12, 1898. Three days previously, while knocking an iron hoop from a barrel, something flew and struck him in the left eye. For twenty-four hours vision was not greatly affected, then pain began and sight grew less. At the time of his visit to me vision was reduced to fingers at three feet.

The aqueous was hazy and pupil contracted. Surrounding the inner third of cornea was an area of chemosis. No wound visible. Patient stated that he was quite certain the particle had not penetrated the eye, as it must have been too large, judging from the shock of the blow; it had nearly knocked him down. (This is a common statement, as all know who see many of these injuries, and not at all reliable for diagnostic aid.) Radiograph showed the body to be a long chip located in upper and inner quadrant and lying with its long axis antero-posteriorly, its posterior end being apparently embedded in the retina. Having eaten a hearty meal shortly before the radiograph was taken, and it being late in the evening, operation was postponed until the following morning. Under anæsthesia the sclera was bared at a point midway between internal and superior recti and some distance back of the limbus. Here an incision about six millimetres in length was made through the sclera and the point of the electro-magnet carefully introduced between the lips of the wound. A click was instantly felt and, on withdrawing the magnet, the particle was seen adhering to the tip. Its shape corresponded very accurately to the image on the plate, which might almost have been a photograph of the body. Ten days later the patient left the hospital with the eye free from irritation and with vision equal to fingers at three feet; six weeks later vision was the same. No details of fundus visible. Patient has not been seen since.

Case 6.—Chas. E., machinist, consulted me May 9, 1898, for an affection of his right eye, stating that the sight began to fail six weeks previously. For several weeks he had been under the care of a specialist, but the eye becoming inflamed and painful, he desired further advice. Examination showed a dilated pupil, evidently from atropia, with what appeared to be a traumatic cataract, portions of the swollen and opaque lens pressing against the cornea. He could not remember to have been injured, though in his work it was common for particles of metal to strike the eye. These, when embedded, were usually removed by one of his fellow workmen. Feeling confident that the eye contained a foreign body, a radiograph was made the same evening. It showed very clearly the presence of a metallic particle, evidently in the lens. The following morning, at the Seattle General Hospital, under anæsthesia, the anterior chamber was opened, and, with the electro-magnet, a minute chip of steel removed from the softened lens. As much of the latter as would come away was easily

extracted, and one week later, the remainder. Recovery smooth, with ultimate vision of $\frac{20}{40}$.

Case 7.—John H., injured one week previously, came to my office July 18, 1898. While striking an iron wedge with a heavy hammer, a piece flew and injured his left eye. Vision was at once destroyed. Irido-cyclitis. From the appearance of the eye over the insertion of the internal rectus, I took it that the particle had entered at that point. Radiograph showed foreign body, spear-head in shape with barbs spread out, in upper and inner quadrant, deep in vitreous. Under anæsthesia an attempt was made to remove it. While the magnet would move the particle, the ends would impinge on the interior surface of the globe and its hold be broken. As the eye was practically destroyed, efforts were abandoned and later enucleation advised, which was refused.

Case 8.—Henry O., October 13, 1898. Injured three weeks previously by particle flying from iron wedge. Iritis, pupil contracted. In lower part of anterior chamber a peculiar-looking purulent exudate, differing from an ordinary hypopyon in that the pus arose in the centre in the shape of a whorl the apex of which reached nearly to pupil, which was blocked by lymph. Very faint scar on cornea midway between limbus and centre. Radiograph shows foreign body apparently in anterior chamber. Under anæsthesia an incision was made at the limbus inferiorly and the tip of the electro-magnet introduced. The click of adhering metal was at once felt, but the body was not withdrawn. The lips of the incision, which was a wide one, were then separated by a German silver spatula and the tip again introduced. It at once adhered to the particle and with quite a perceptible pull was withdrawn with the particle attached to its extremity. Irritation rapidly subsided and the patient recovered with vision $\frac{20}{200}$.

Case 9.—Mrs. R., November 12, 1898, while watching a log being split by an iron wedge which was struck with a heavy sledge-hammer, suddenly felt a sharp pain in the right eye. Vision at once became blurred and the eye painful. Twenty-four hours later she consulted me. The pupil was contracted and partly filled with lens matter. Atropia was instilled, but pupil responded only feebly at upper half. Radiograph failed to show foreign body. The same evening, under anæsthesia, preparatory to opening the anterior chamber, which I felt contained the particle, the large blunt tip of an electro-magnet was placed in contact with

cornea and slowly moved upward. With the starting of the magnet a scale of metal followed it from behind the iris into the pupillary space. A wide incision was then made at the limbus upward and the piece removed by the magnet. So thin a scale I have never seen. Rubbing it between the finger and thumb, its presence could not be felt. This readily explains why the radiograph failed to show it. The thin edge was in a line with the rays. It is the only instance in which the X-rays have failed me. Iritis of moderate severity ensued, resulting in dense capsular opacity.

Case 10.—A. J. B. consulted me April 9, 1899. He stated that he had been injured three weeks previously by something striking his left eye while hammering a piece of iron. The physician who attended him is said to have removed a foreign body, but pain and failing vision caused him to seek further assistance. Examination showed marked siderosis, pupillary space occluded by lymph, aqueous cloudy. At inner and lower quadrant of cornea faint cicatrix and an appearance which might be taken for a foreign body. Radiograph was attempted, but the patient's timidity was so great that but one exposure was made. This showed a minute particle below the centre of the eye, but every detail was so blurred that I could not be certain as to exact depth. The following morning, under anæsthesia, the anterior chamber was opened by an incision downward, but no foreign body detected by magnet. Six days later, the patient being assured he would not be injured by the rays, a second attempt was made to obtain a radiograph. Two exposures were made on the same plate. This gave quite clearly the location in lower inner quadrant and posterior to lens. Under anæsthesia, a T-shaped incision was made through sclera at the point indicated, *i. e.*, between internal and inferior recti and about seven millimetres posterior to limbus. The steel was extracted at the second attempt without loss of vitreous. Ultimate recovery with vision $\frac{20}{10}$.

Case 11.—Wm. D., miner, was referred to me by Dr. J. H. Koons, of Dawson, N. W. T. While sharpening a pick a piece flew from the hammer and injured his right eye. This occurred July 26, 1899. For two days vision was not perceptibly impaired, but on the third day the eye became painful and the sight was rapidly lost. In that remote region, the centre of the Klondike gold-fields, there were no facilities for treating such injuries, and he was referred to me. After a journey of nearly two thousand

miles he reached Seattle, August 12th. Examination showed a wound one millimetre back of limbus in upper and outer quadrant. Pupil a long oval, the greater diameter of which was toward the wound, into which the iris had prolapsed. No reflex from fundus. Downward and outward a whitish-yellow mass was seen, evidently exudate surrounding the particle. Vision, perception of light; irido-cyclitis. Radiograph taken that evening showed metallic particle in lower outer quadrant. Assisted by Dr. Alfred Raymond, I bared the sclera at a point between external and inferior recti, about eight millimetres back of limbus. Here a T-shaped incision was made, and the blunt tip of the large electro-magnet described in these ARCHIVES, vol. xxviii., No. 2, gently placed at the lips of the wound. The patient at once complained of great pain, but the particle did not appear. It was again used, and this time introduced just within the wound; on carefully withdrawing it the eye bulged for some distance around the incision, and I thought the particle must be a very large one. Suddenly there shot from the opening a mass of exudate adhering to the magnet, fully as large as a small bean. Embedded in this was a piece of steel.

Removing this particle was, under the circumstances, a forlorn hope as far as restoring vision was concerned, but as the other eye was practically useless, owing to extensive choroidal disease existing since childhood, the attempt was justifiable. From the time he entered my office in the evening until the eye was dressed and he was ready to be taken to his home, was one hour and ten minutes. In this time the radiograph was taken, the plate developed, fixed, and given a preliminary washing. Dr. Raymond, who assisted me, and to whom I telephoned, came from his residence, a distance of nearly a mile; dressings were prepared, instruments sterilized, and the operation performed. I mention these facts, as the statement has been made by Hirschberg[1] that the X-rays are too complicated and require too much time to be of value.

In all these cases the method of locating the foreign body was by taking two radiographs on the same plate, the tube being moved a short distance from its primary position in

[1] *Die Magnet-Operation*, p. 8.

making the second exposure. As a "finder," a large pin was placed in a piece of adhesive plaster, and this made to adhere to the closed lids in a vertical position. Care was of course taken that the middle of the pin coincided with the centre of the cornea. In this way two images were obtained.

The position of the body relative to the pin gives us, first, a very accurate estimate of its depth in the eye; second, nearly as accurate an idea of its position with regard to the horizontal meridian, whether above or below it; and lastly, a close approximation of its position relative to the vertical meridian, as, if the two images of the body are more widely separated than are the images of the pin, we can be certain the body was nearer the source of illumination. If separation is less, we know the body must have been farther removed and closer to the plate. The pin having occupied the position of the vertical meridian as closely as possible, we can see almost at a glance whether the particle is to the inner or outer side of this meridian. In this way we can locate the body with fairly great accuracy by simply glancing at the plate if it be a good one and properly developed. *Precise location of a foreign body within the eye, not directly visible, is impossible by any known method.* Nor is such location necessary for successful treatment. All that is absolutely required is a knowledge of its approximate depth, its position relative to the vertical meridian, whether to the inner or to the outer side, and whether above or below the horizontal meridian — in other words, its depth and in which quadrant of the eye it lies. This, I think, will not be denied by any one who has had much experience in the removal of foreign bodies from the interior of the eye.

That the proper use of the X-rays will furnish us this information has been abundantly demonstrated within the past two years by many observers. How closely these requisites are furnished by other methods may be seen from a consideration of their character.

First may be considered the sideroscope of Asmus. That this instrument is of great value cannot be denied by the adherents of any method. Just how accurate it is in the

hands of one skilled in its use may be seen by reference to a recent publication by Hirschberg.[1]

When all conditions are complied with, particles of iron may be detected in any one of the four quadrants of the eye, in the lens or posterior to it. Its disadvantages are, however, many and serious. Thus the extreme sensitiveness of the magnetic needle necessitates its being far removed from any masses of iron. For this reason it should be set up in a room especially devoted to its use and which should be bare of other furniture than that necessary to the apparatus. In clinics in the large cities this may be done, but for the ophthalmic surgeon's private practice in the smaller places this would almost debar him from its use, as cases requiring its aid are not so very common, certainly not enough so to justify the added expense. According to Linde[2] the current from electric cars run by either the overhead or underground trolley system renders the apparatus useless during the time the cars are passing. Asmus also states that the masses of iron in vehicles passing the building in which the instrument is located interfere seriously with accurate reading. While bodies may be located with fairly great precision, we derive no knowledge of their shape and only an approximate idea of their size, as a small particle close to the surface will exert as great an influence on the needle as a larger one farther removed.

The only other method worth considering is that in which the large magnet is used and which by its traction on the foreign body causes the sensation of pain or dragging, or produces visible changes in the ocular tissues, bulging of iris or sclera. This method, while having a certain value in the absence of either the X-rays or the Asmus sideroscope, is so uncertain and may at times be so dangerous that personally I feel it should only be mentioned to be condemned as a method for general use. It has a value, as have all methods, one might say, but it is very slight and restricted to very exceptional cases. No knowledge of the location of the body is furnished us, nothing as to shape or size, and

[1] *Die Magnet-Operation in der Augenheilkunde*, 1898.

[2] *Centralblatt für praktische Augenheilkunde*, September, 1898, S. 262.

its dangers are many when used for this purpose. A large rough particle in the vitreous may be dragged against the ciliary processes so forcibly as to bruise and set up a severe inflammation, or it may become entangled and resist every effort at removal when the eye is opened. As an example of what might have occurred had this method been used, take Case 5. Here the particle was long and jagged. Approaching this eye to the large magnet would have resulted in the particle, owing to its size, being powerfully attracted to the anterior part of the globe and forcibly pressed against lens and ciliary body. From this position smooth extraction would have been improbable, if not impossible. Aside from these objections, it is not at all reliable, for the patient may perceive no sensation when the magnet is approached to the eye and yet an iron chip be present. Cases of this kind are not uncommon.

Knapp[1] reports three instances. Hirschberg[2] cites several cases, and in a footnote makes this remark: "The statement that the large magnet is the best diagnostic aid is false. In numerous cases, as in this one, the finest splinter was indicated by the sideroscope, while the large magnet failed to produce any sensation when applied to the eye." As a reliable and scientific method, therefore, I think we are justified in dismissing from consideration the use of the large magnet as a sideroscope. The question then lies between the X-rays and the sideroscope of Asmus.

The objections to the former are mainly that their use is generally assumed to require a technical knowledge of electricity and to some extent of photography. This is more imaginary than real. As the apparatus is now furnished, no knowledge of electricity is requisite, at least no more than one can acquire in a few days' reading. The developing of plates is so simple that a few lessons from a photographer will enable one of ordinary intelligence to acquire the ability to do this for himself. As far as time consumed is concerned I think there is little difference between the two methods. Plates may be kept ready in holders if necessary, and the

[1] Archives of Ophthalmology, vol. xxviii., p. 172.
[2] *Loc. cit.*, p. 87.

taking of the radiograph, developing and fixing the plate, may all be done in twenty minutes. All the information obtainable may be had from the plate after fixing better than in the finished print, so that no time need be lost in this respect.

Radiographs may be taken in broad daylight, as well as in darkness, in one's office—as I do—as well as in a specially arranged room. In fact the use of the apparatus takes but little more time than does the thorough testing of the visual fields with a perimeter. By the use of the newly introduced Wehnelt interrupter, coils for Röntgen-ray uses may be greatly simplified and the cost decidedly lessened. Where coils giving ten- to fifteen-inch sparks were formerly required, the same work can now be done with those giving from six to ten. No assistant is required.

In my opinion, from what has been said by the most ardent advocates of the Asmus sideroscope, as well as from the statements of those who have tried and discarded the instrument, and from theoretical considerations, it is unsuited to the wants of the private practice of the ophthalmic surgeon. Where room can be had in a large clinic, it may find a place, but I venture to predict that the majority of those who require an instrument for the detection and location of iron particles within the eye will ultimately provide themselves with an X-ray apparatus and depend on it solely for such purpose.

TREATMENT OF CORNEAL ULCERS AND CORNEAL FISTULÆ BY ELECTROLYSIS.

By FRANK CORNWALL, M.D., San Francisco, Cal.

UPON a recent visit of my esteemed teacher, Dr. David Webster of New York, he took occasion to remark that a townsman of mine, Dr. Martinache, first published the treatment of indolent ulcers of the cornea by galvano-cautery. Upon my remark that I employed electrolysis instead, he asked a description of my method. He then suggested that I have it published.

I shall report only three cases as illustrative ones. I will state that I have given this treatment a trial in phlyctenular ulcers of the cornea, and that the results have always been to aggravate the condition. The indications for the use of electrolysis are those in which galvano-cautery is employed. It is not sufficient to say that it may be administered in any case in which the process of repair is slow or inefficient, as this occurs in phlyctenular ulcers of the cornea.

There are ulcers of the cornea which are not phlyctenular, that at times have the appearance of being progressive, yet which remain for weeks characterized by slight if any invasion, and in which photophobia and reflex neuralgia are very great. Electrolysis is indicated in these cases and also in what are called serpiginous ulcers. Its broadest field of usefulness, however, compared with any other method, is in chronic central ulcers which are very slight, the repair being almost complete. The lack is in the epithelium, which is at best imperfect. Slight causes create relapses, when there will be great photophobia, pain, etc. Every oculist is

familiar with this kind of case, so I hope my meagre description will answer the purpose.

In the treatment of this case the voltage must be very low and the ampereage not more than ¼ milliampere. Operating under a magnifying-lens, the parts where the epithelial disturbance is greatest may be slightly touched with the end of the needle. If there are parts wherein Bowman's membrane seems involved, deeper and more thorough work will be needed, but caution should be exercised, and not too much done at one sitting.

REPORT OF CASES.

CASE 1.—Miss R., æt. thirty. Applied August 8, 1899. *Torpid corneal ulcer.* Four years ago had corneal ulcer without assignable cause. Result, superficial opacity, and facette 2 *mm* in diameter. Subsequently the eye remained irritable, with tendency to become hyperæmic on slight use. Nine months ago had a mild relapse, which was slow in recovery. Treated for one month with atropine and mercurial applications with no benefit. Used the electrolytic needle as above directed, which arrested the ulceration, but left the eye irritable. Six months subsequent to the first treatment by this method applied the needle again, and this time more thoroughly. The needle, although very small, was very smooth and rounded at its point, such as used for epilation. Wherever the epithelium seemed imperfect it was touched. Following this there were three or four days of hyperæmia, photophobia, etc., after which there was marked improvement. One month later the treatment was repeated, since when the eye has been perfectly sound and well.

CASE 2.—Mrs. H. *Fistula corneæ.* This case was notable, inasmuch as there was a question of its curability by two oculists of repute.

The opening in the cornea was situated very near the corneal periphery, and was so small that almost the normal tension of the eye was maintained. My method of procedure was as follows: The temper was taken out of a jeweller's broach, the point of which was very slender. Then about one millimetre of its point was bent at a right angle to the main shaft, and after anæsthesia by cocaine, the needle was inserted so that the point rested underneath the cornea. The dispersing electrode was placed

upon the cheek, and the ampere metre was made to read about ¼ milliampere. By turning the shaft of the needle the bent angle of the point was made to describe a circle, and thus the proximal surfaces of the cornea and iris were eroded. When this was accomplished the needle was withdrawn, straightened, and with its point the inner surface of the ring was also eroded.

This completed the operative procedure, and took less time than it would to describe it. The eye was properly bandaged and the patient required to rest for a couple of days, when the cure was complete.

CASE 3.—Mr. B., blacksmith. *Central ulcer of the cornea from injury.* Been treated by the family physician three or four weeks, during which time there was great pain and photophobia, in spite of the liberal use of atropine and cocaine. Inspection upon application at my office showed a long and narrow ulcer, which from its history and appearance was caused by a blow, bruising the part.

There was, for about 2 *mm* of this trough-shaped ulcer, an infiltrated base. Superficial offshoots radiated from the greater trough, a couple of them reaching in irregular directions almost to the corneal periphery. I treated the ulcer for two weeks with varying results with atropine, hot packs, calomel and other mercurial salves, etc. Finally, upon a relapse, I began the treatment by electrolysis. At the time of the first application of this method the pain and photophobia were great. I drew the point of the needle along all the fissures, and gave the part with infiltrated base particular attention. The effect was extraordinary. In half an hour the pain, photophobia, etc., were entirely relieved, and my patient, for the first time in two months, removed the bandage from his eye and walked on the street erect.

REMARKS.

I wish to call particular attention to the position of the dispersion electrode in this procedure, viz., that it should be as near as practicable to the operating electrode. It may seem superfluous. I thought several years ago that I had given electrolysis a fair trial in surgery of the eye and nose, and condemned it in many instances wherein I now get from it the happiest results. This all came from employing a current of too high a voltage, which produced great pain and irritation.

ON THE INJECTION OF A WEAK STERILE SOLUTION OF SODIUM CHLORIDE INTO COLLAPSED EYES.[1]

By JOSEPH A. ANDREWS, M.D., New York.

(*With a text illustration.*)

AT Dr. Knapp's request, I have written the following note on the injection of a sterile salt solution into collapsed eyes:

In July, 1891, a young woman in the Ophthalmic Division of the City Hospital, Blackwell's Island, N. Y. (she was at the time a prisoner in the Penitentiary, the medical services of which institution belong to the City Hospital), urged me to remove a traumatic cataract which disfigured her left eye. Before examining the eye critically I had remarked to my house surgeon that such eyes were generally unfavorable for operation. The eye had been injured by a blow (not a penetrating wound) more than a year before. There were no signs of active inflammation. The lens was white and opaque and about half its normal size. The central part of the anterior capsule was occupied by a dense chalk-white spot; there were two posterior synechiæ above; the iris and shrivelled lens were tremulous; no nystagmus; tension, by comparison with the fellow-eye, seemed to be about normal. The light projection was good in every part of the field. There was, therefore, reason to believe that the patient had escaped serious complications in the background of the eye; and the hope was entertained that useful vision might be restored, provided the lens could be removed without undue injury to the eye.

[1] A note supplementary to Dr. Herman Knapp's article in these Archives, No. 3, 1899, p. 308.

In other words, it was not simply a question of removing the lens for cosmetic purposes. Nevertheless, I felt fully prepared for a considerable loss of vitreous during the attempt to remove the lens. The operation was performed under general anæsthesia and antiseptic precautions. The instruments were boiled and the conjunctiva wiped with absorbent cotton dipped in a boiled solution of sodium chloride, the cul-de-sac being afterward irrigated with the same solution. Relatively speaking, as compared with the size of the lens, I made a small corneal flap upward, and excised a piece of iris. The lens was removed, together with the capsule, but not before a large amount of vitreous had been lost. I should say that more than half of the vitreous escaped through the wound. The whole eyeball collapsed. I injected into the globe a quantity of a warm sterile solution of sodium chloride (6–1000). The globe was restored to its shape, and before the dressing was applied the lips of the wound were in coaptation. Fortunately, the operation was done while the patient lay in her bed, so that she escaped the danger which might have been incurred by removing her from the operating-table. I had apprehended that the sudden and great loss of vitreous might give rise to detachment of the retina; for this reason the patient was kept in bed for a longer time than would have been necessary had she escaped serious complications during the operation. The recovery was smooth and uneventful. The resultant vision was $\frac{20}{30}$.

This is the only instance in which I have had an opportunity to introduce a solution of any kind into a collapsed eyeball after loss of a large amount of vitreous. I did not publish the case at the time, because I wished to await further experience with the procedure, for I did not feel sure of the extent of its utility in older patients in whom lack of vitality or other causes might materially influence the results sought for. Dr. Knapp's experience seems fully to justify his recommendation of the procedure, inasmuch as his subjects were well advanced in that stage of life when we should expect a less healthy condition of the blood-vessels than would be likely to obtain in a subject of my patient's age, Dr. Knapp's patients having been aged respectively fifty-two and fifty-eight years. Although the above-cited case is the only one in which I have injected the physiological salt solution where the whole eyeball was collapsed, I have for

many years followed the practice of expelling cortical matter from the eye by washing out the anterior chamber with a sterile salt solution (6–1000).[1] I have generally preferred this procedure to the manœuvre of rubbing such matter out of the eyes by means of the lids or stroking the cornea with a spatula, and have reason to believe that I have thus sometimes averted the evil consequences of bruising the iris in eyes prone to inflammation. My experience has been repeated so many times than I can confidently declare that these intraocular injections are wholly free from danger. In June, 1897, assisted by Dr. G. W. Otto, at Santa Barbara, Cal., I extracted a cataract in a man seventy-eight years of age. It was a simple extraction. The lens came out in its capsule. There was no escape of vitreous, but the cornea was wrinkled and collapsed to an extraordinary degree. I closed the lids and waited a reasonable time for the aqueous to reform and restore the shape of the cornea. As this did not take place, a warm sterile salt solution was injected into the anterior chamber. The cornea took its shape sufficiently to place the lips of the wound in apposition. The recovery was smooth. In two similar cases of extraction, done this year, in patients whose ages were respectively seventy-six and eighty-four years, the result of injecting the salt solution into the anterior chamber was equally favorable.

It was a habit of the late Dr. C. R. Agnew, while the patient was being anæsthetized, preparatory to the extraction of cataract, to pinch up a fold of skin on the back of the patient's hand, or elsewhere, and remark to the bystanders, in case there was a greater than usual lack of elasticity in the skin, that we might expect in such cases a similar lack of elasticity in the cornea, and he thought that this condition had an unfavorable influence on the healing process. This is, of course, an old observation, and I know that such cases have usually not done well, because, it seemed to me, the lips of the wound could not be made to apply to each other.

I am not aware that there is any mention in ophthalmic

[1] Joseph A. Andrews, "An Instrument for Syringing out Cortical Matter in Cataract Extraction," *Transactions of American Ophthalmological Society*, July 19, 1892.

literature of intraocular injections for collapsed eyes until last May, when Dr. Knapp published his cases. At the time that I began to inject a sterile salt solution into the anterior chamber to remove cortical matter after cataract extraction, ten years ago, I thought the procedure was a novel one, but I found that solutions had been injected for this purpose early in the century, and the results were, as might have been expected, unfavorable, because the solutions were not sterile. Panas has advised the use of a solution of biniodide of mercury for washing out cortical matter, but this solution was shown to be objectionable. The apparatus which I use for introducing the salt solution into the eye is one which I devised for the purpose several years ago (Fig. 1). It consists of a glass bottle with a hollow glass stopper which is extended into a tube with a fine, smooth, bent extremity. The bottle and stopper being blown (not cast), they permit of ready sterilization of the solution by boiling over a spirit lamp. The solution comes in contact with glass only, it being never necessary to allow the fluid to touch the rubber nipple. Meyer's lachrymal syringe, which Dr. Knapp has used, is open to the objection that it cannot be so readily sterilized. The solution of salt (6–1000) should be filtered through good filter paper (not through cotton), and care be taken to exclude foreign particles, etc.

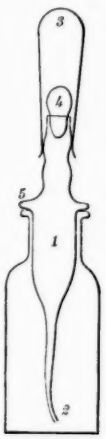


FIG. 1.

One half actual size.

The glass stopper (4) closes the hollow stopper (1) and prevents the fluid in the bottle from becoming contaminated by contact with the rubber nipple (3) when the bottle is not in use; the collar (5) protects the mouth of the bottle from collections of dust, etc. See *Trans. Amer. Oph. Soc.*, 1892.

E. B. Meyrowitz, 104 East 23d Street, New York, makes these bottles.

SERIES OF ONE HUNDRED CASES OF CATARACT EXTRACTION.

By Dr. C. E. FINLAY, of Havana, Cuba.

THE putting into practice by a beginner of the teaching received from a first-class master, may prove interesting and instructive to some of the readers of these ARCHIVES, hence my presentation to them of this report of my first one hundred cataract extractions. These have been performed at several of the general and private hospitals of this city, and at the private residence of a good many of the patients, —the nursing often leaving a good deal to be desired, making the fair amount of success with which they have been attended all the more satisfactory. This I attribute, in great part, to the valuable experience I acquired during my three years' connection with the New York Ophthalmic and Aural Institute, during which I had the opportunity, not only of assisting at almost all the operations of such an expert as Dr. Knapp, but also of following their after-treatment to the end, thus gaining the knowledge of how to meet the different complications that may arise, both during and after the operations, and enabling me to pull through a good many cases which might not otherwise have done so well.

METHOD OF OPERATING.

PREPARATIONS. *Instruments.* — After careful inspection and examination of the instruments as regards their physical cleanliness and condition (sharpness of cutting instruments), I have them boiled for twenty minutes before the operation in a 2 % carbolic acid solution ; from this they are transferred

to a tray with a 3% boric acid solution, from which they are taken as required during the operation. The dishes and trays to be used, I disinfect by burning alcohol in them.

Patient.—The day before the operation I prescribe a purge, and the morning of the same day I have the patient take a bath, and have his head shampooed. Immediately before the operation I thoroughly wash and scrub the skin of lids, temple, forehead, and face, first with soap and water, and then with a 1:1000 solution of bichloride of mercury; special attention being paid to the lid margins and eyelashes. The eye to be operated on I then isolate from the rest of the head and face by cloths soaked in the same solution. The conjunctival sac is next thoroughly washed out several times with a 1:5000 bichloride of mercury solution.

Surgeon.—I then make my hands and arms aseptic as for any other important surgical operation, by scrubbing with brush and soap and water, and then with a 1:1000 bichloride solution.

Anæsthesia.—I have only made use of local anæsthesia in the shape of a 4% solution of cocaine; I begin to instil it twenty minutes before the operation, repeating it every five minutes till the pupil dilates. It has been perfectly satisfactory, the only disagreeable result, in a few cases, being an exaggerated hypotony which was embarrassing; the drying up of the cornea, which is so frequent, promptly disappears on allowing any fluid to flow over it.

OPERATION.—The technique which I endeavor to follow is that employed in Knapp's clinic during my stay there, viz.:

The eye being anæsthetized, and the instruments, patient, and operator ready, I introduce the speculum, and once more wash the cornea and conjunctival sac with the 1:5000 bichloride solution, and proceed to make the section of the cornea (with a Graefe knife), exactly at the transparent margin, comprising from $\frac{2}{5}$ to $\frac{1}{2}$ its circumference. The next step is Knapp's peripheric cystotomy. The next, the expulsion of the cataract by pressure at the lower corneal margin with Daviel's spoon, and counter-pressure above the upper lip of the wound with the wire loop. The pupillary area is then cleansed, the iris replaced, and the conjunctival

sac and wound washed out with a neutral aseptic solution (boric acid, boiled water); after the section of the cornea, except under extraordinary circumstances, I do not use bichloride, so as to avoid staining of the cornea. Pads of aseptic gauze and cotton are then placed over both eyes and a binoculus is applied.

The light employed is ordinary daylight, focused on the eye by means of a hand-lens. It is most important that the illumination be good, as one never knows when an accident may call for extra fine manipulation, such as the introduction of the wire loop into the eye to fish out the lens, a poor illumination being then a great handicap, as I have had the opportunity to find out, on two occasions, to my and the patient's cost.

Iridectomy.—I have only performed an iridectomy under some one of the following circumstances: 1st. When the iris has been injured in the corneal section. 2d. When through stickiness of the lens, or too small a section, difficulty was experienced in expelling the cataract by the usual method, or when necessity arose for manipulations which entailed the introduction of instruments into the posterior chamber, especially when vitreous was lost before the expulsion of the cataract. 3d. When after the expulsion of the lens, the iris showed a tendency to prolapse or resisted replacement.

Under these conditions, the comparison of the results obtained in the cases where iridectomy was performed with those of simple extraction, is not fair and cannot lead to any correct conclusions.

Corneal Section.—One of the most important steps in the operation is without doubt the section of the cornea, and it is the one which a beginner finds most difficulty in executing according to his desire and intentions,—the tendency on his part being to make it too small and too corneal. In younger persons a smaller section than that advocated above may suffice, owing to the smaller size of the nucleus; in persons over seventy, care must on the other hand be taken to make it full size. In a good many of the cases where I had to perform an iridectomy, it was due to some flaw in the section; before resorting to this procedure, I always first tried

if enlarging the wound with the scissors would not answer the purpose. When the section is too peripheric, an iridectomy is also necessary to forestall a subsequent prolapse.

Cystotomy.—I have not found Knapp's peripheric cystotomy, which I always performed, to increase the difficulties of extraction; in some difficult cases it has enabled me afterwards to introduce the wire loop through the tear in the capsule and to extract the lens with it without loss of vitreous (a secondary cataract subsequently forming).

Expulsion of the Lens.—In ordinary cases I have employed the method mentioned above; in others, when some difficulty has been experienced, the external manipulation, the brilliant performance of which by Dr. Knapp all attendants at the New York Ophthalmic and Aural Institute have occasion to admire. When loss of vitreous occurred before the cataract had been expelled, where this was luxated, and in some cases of undue stickiness of the lens (without loss of vitreous), where the two other methods had proved inefficient, I have employed the wire loop. This instrument is almost dispensed with by Dr. Knapp, except for the purpose of applying counter-pressure above the superior lip of the wound. I do not think I have seen him introduce it into the eye more than three times during my connection with the Institute; he supplants it by the above-mentioned manipulation, by means of which I have on several occasions seen him expel a dislocated cataract with no, or a minimum, loss of a fluid vitreous. This is due to his great executive skill and dexterity, which nobody can hope to attain in his first hundred extractions. In these complicated cases, I have, with the wire-loop extraction, lost only a minute amount of vitreous—in a few, none at all; whereas, in the few of these cases in which I have made use of the external manipulation, the loss has been more considerable, and in most cases I have had to fall back on the wire-loop extraction in the end. In this, very delicate operating is necessary, care being taken to pass the loop well behind the lens, then, slowly tilting the lower end forward and pressing the cataract against the cornea, to extract it by gentle traction; the greatest care being in the meanwhile taken that not the

slightest pressure be applied to the eyeball. I have had recourse to this procedure twenty-three times, in eight losing no vitreous. I always precede it by an iridectomy.

Toilette.—Care must naturally be taken to remove the excess of soft cortical matter which often remains behind, especially in cases where the cataract is not quite mature; for this purpose external manipulation is unsurpassed. At times, however, some difficulty is experienced on account of unruliness of the patient or some other cause, and it is then not prudent to insist too much; the lens matter left behind in these cases, I have found to absorb more or less readily, producing very little irritation, if care be taken to maintain the dilation of the pupil with atropine. In these cases secondary cataract is apt to develop sooner. With the washing out of the anterior chamber, I have had no personal experience.

Reduction of the Iris.—There is no compromise in insisting on the necessity of doing this thoroughly, special attention being paid to the angles of the wound. It is quite as important in cases where an iridectomy has been performed, as in those of simple extraction. Where any tendency to prolapse or resistance to reduction exists, an iridectomy should be performed at once.

AFTER-TREATMENT.— I always insist on rest in bed, with closure of both eyes, for three or four days after the operation, differing in this from some of my colleagues, as I consider perfect quiet necessary to the complete success of the operation. The first twenty-four hours I keep the patient on his back, put him on fluid diet, have an attendant or nurse at hand to supply his needs, at night tying his hands to the foot of the bed; prescribing an opiate if the pain, after the operation, be very severe. I always inspect the eye the day after the operation, especially if any pain be complained of; and if there be no prolapse and the anterior chamber closed, I instil atropine. I keep both eyes closed for three or four days, and do not remove the bandage from the operated eye until the seventh to tenth day. After the first day I allow the patient to lie on his sound side. I permit the diet to be more and more solid as the healing progresses, the first few days care being taken to have all the solid food

as finely cut up as possible, to avoid the movement of the whole head which chewing entails. The course of the case guides my further treatment.

ACCIDENTS AND SUBSEQUENT COMPLICATIONS.

Collapse of the Cornea.—This occurred four times in two patients,—one being very old and the other having a "keratoglobus" of both eyes with an excessively thin cornea. The extraction was somewhat more difficult than usual, owing to the excessive hypotony found in these cases. One eye was lost from infection.

Loss of vitreous occurred in 8 cases of simple extraction, in 14 cases of extraction with iridectomy, and in the 2 cases of extraction after preliminary iridectomy. Four of these cases were lost,—1 from panopthalmitis, 2 from cyclitis, and 1 from choroidal hemorrhage; but it is not reasonable to attribute the loss solely to this accident. Loss of vitreous was naturally much more frequent in my first operations.

Iridodialysis occurred in 1 case, owing to a sudden movement of the patient during the performance of an iridectomy. The final result was not affected by the accident.

Choroidal hemorrhage, involving the loss of the eye, as regards sight, occurred in 1 case some twelve hours after the operation (no suppuration). A similar accident had occurred in the other eye several years before, after an extraction by a brother oculist.

Prolapse of Iris.—This *bête noire* of simple extraction, which almost invariably was traumatic, occurred eleven times after these operations, and six times after extraction with iridectomy. In the former cases the prolapse was abscised immediately in six cases, and in one after six weeks. With regard to the dealing with this complication, I followed the precepts of my teacher, viz., excision, if seen within the first twenty-four hours of its occurrence; expectation and possibly later abscission, if seen later; it is principally with the object of finding out if this complication has occurred, that I inspect the operated eye the day after the operation. As a rule, when it occurs it does so in the first two or three days, but I have seen it as late as the tenth. In none of the

eyes that were lost did prolapse occur, nor did any untoward result follow an abscission.

Iritis occurred five times after simple, and seven after combined, extraction. As a rule, it was more or less mild, and yielded readily to atropine; at times it was, however, more severe, in three cases bringing about a closure of the pupil, necessitating further operative interference.

Cyclitis, involving the loss of the eye, occurred in three cases of extraction with iridectomy.

Panophthalmitis was the result of two extractions with iridectomy.

SECONDARY OPERATIONS.

Discission. — No cataract extraction can be considered complete,— unless the lens has been extracted in its capsule,— till a discission has been performed, as, even if excellent vision be primarily obtained, at the end of a few months, or a year or two, this will have materially diminished, on account of wrinkling, thickening, and opacification of the capsule, this not being then in as good a condition for discission as in the first two or three months. I therefore consider the operation indicated in almost every case, even with as good a vision as $\frac{5}{40}$, although in these cases it is difficult to obtain the patient's consent. I use in its performance Knapp's discission needle, and operate by artificial light. I have performed it twenty-seven times after simple, fourteen times after combined, iridectomy, and once after an extraction with preliminary iridectomy. I have met with no accidents; in the two cases where the ultimate vision was less than that before the discission, this was due to extraneous causes.

Iridectomy for closure of the pupil was performed four times in three patients; three times without appreciable benefit.

Iridotomy for the same purpose was performed twice,— once with a moderate amount of success; both patients had been previously iridectomized. The two last operations are mostly "forlorn hopes," hence the poor results obtained.

Extraction of Secondary Cataract was performed with good result in one case, where discission had proved ineffectual.

RESULTS.

In estimating the results of my cataract extractions, I have separated the non-complicated from the complicated cases. In the former, the visual results have been my guide; the latter have each been judged on its own merits. These visual results, after the primary operation, I have considered good, when superior to $\frac{15}{200}$; moderate, when between $\frac{4}{200}$ and $\frac{15}{200}$; and failures, when below $\frac{4}{200}$. Those after the secondary operation I have considered good, when a decided benefit was obtained by the operation; moderate, when there has been little or no benefit but no harm has been done; and failures, where the vision, after the secondary operation, was less than before.

RESULTS.

Primary Operation.	Good.	Moderate.	Failure.	Total.
Simple Extraction:				
Non-complicated cataracts	47	5	1[1]	53
Complicated cataracts	5	2	..	7
Total	52	7	1	60
Extraction with Iridectomy:				
Non-complicated cataracts	21	2	4[2]	27
Complicated cataracts	7	3	1[3]	11
Total	28	5	5	38
Extraction after Prelim. Iridectomy:				
Complicated cataracts	2	..	..	2

Secondary Operations.	Good.	Moderate.	Failure.	Total.
Discission	28	12	2	42
Iridectomy	..	1	3	4
Iridotomy	..	1	1	2
Extr. of Sec. Cataract	1	..	..	1
Total	29	14	6	49

Thus, in the 100 extractions, there were:

82 good results,
12 moderate results,
6 failures.

100

[1] From choroidal hemorrhage. [2] Two cases from panophthalmitis; two from cyclitis. [3] From cyclitis, with closure of the pupil.

TABULATED REPORT OF CASES.

No.	Name—Age—Health.	Character of Cataract.	Operation—Healing.	Prim. V.	Secondary Operation.	Ult. V.	Remarks.
1	Juan Garcia. 64 yrs. Alcoholism. Syphilis.	Mature. Durat. 5 yrs. L. E.	Simple extraction. Loss of vitreous (after expulsion of lens). Healing normal.	$\frac{15}{40}$			R. E. previously successfully operated by Dr. S. Fernandez. 4 yrs. after extraction chorio-retinitis specifica (both) with ultimately consid. dim. in S.
2	José Sanchez. 60 yrs: Good.	Almost mature. Durat. 1 yr. R. E.	Extr. w. Irid. Slow clos. ant. ch.	$\frac{15}{80}$	Discission.	$\frac{15}{80}$	Irid. due to inj. of iris in section.
3	Maria de Jesus Polanco. 80 yrs. Good. (Negress.)	Complicated. Poor projection. R. E.	Simple extr. Healing normal.	$\frac{15}{200}$	Disc.	$\frac{15}{60}$	L. E. cataract. No. P. of L.
4	Miguel Gastamienza. 53 yrs. Good.	Mature. R. E.	Extr. w. Irid. Ang. prolapse on 10th day (traum.).	$\frac{15}{200}$	Disc.	$\frac{15}{40}$	Irid. on account of tendency to prolapse.
5	Ramona Inclan. 45 yrs. Good.	Mature. R. E.	Simple extr. Healing normal.	$\frac{15}{60}$	Disc.	$\frac{15}{60}$	
6	Jimena Pichardo. 65 yrs. Weakly. (Mulatto.)	Mature. R. E.	Simple extr. Healing normal.	$\frac{15}{60}$	Disc.	$\frac{15}{40}$	
7	Rosario Valdes. 60 yrs. Good. (Mulatto.)	Hypermat. Durat. 16 years. L. E.	Simple extr. Lens expelled in capsule (imperf. cystotomy), loss of vitreous, iris folded back. Healing: sm. ang. prolapse.	$\frac{15}{60}$			
8	Rosario Valdes. 60 yrs. Good. (Mulatto.)	Hypermat. Durat. 16 yrs. R. E.	Extr. w. Irid. Ang. impactions.	$\frac{15}{100}$	Disc.	$\frac{15}{70}$	Irid. due to tendency to prol. Later V. decreased to $\frac{15}{100}$.
10	Rafaela Calzado. 45 yrs. Good.	Almost mat. Durat. 1½ yrs. L. E.	Ext. w. Irid. Moderate iritis.	$\frac{5}{100}$	Disc.	$\frac{15}{40}$	
9	Rafaela Calzado. 45 yrs. Good.	Mature. Durat. 2 yrs. R. E.	Simple extr. Slow clos. ant. ch.	$\frac{15}{200}$	Disc.	$\frac{15}{40}$	Iris injured in section.
11	Venancia Pacheco. 44 yrs. Syphilis.	Soft. Complic. L. E.	Simple extr. Loss of vitr. (lens and some vitr. escaped immed. on sect.). Healing: impaction of iris.	$\frac{15}{60}$			R. E. had been previously successfully operated on by Dr. Lopez. 3 mos. after extr. severe iritis (R.), recovery. 2 yrs. later severe choroiditis (both), recovery, w. S., R. = O., L. = $\frac{15}{100}$.
12	Bonifacio Varona. 77 yrs. Atherom. arts. Urine=alb.	Almost mature. Durat. 1 yr. L. E.	Simple extr. Sm. central prolapse.	$\frac{6}{200}$ Estimated	Disc.	$\frac{15}{200}$	

13	José Quintana. 43 yrs. Good.	Complic. traumatic. Durat. 1 yr. R. E.	Extr. after prelim. Irid. Laborious extr. w. wire loop, slight loss of vitr. Healing normal.	$\frac{15}{40}$			Cataract ex. for body in iris wh. removed 1 year before. 2 years after extr. detachment of retina.
14	Miguel Gastamienza. 54 yrs. Good.	Mature. L. E.	Extr. w. Irid. Panophthalmitis.	V. = O.			Irid. due to inj. to iris in section.
15	Martin G. Setuain. 64 yrs. Good.	Morgagnian. Durat. 5 yrs. L. E.	Simple extr. Loss of vitr. Extr. w. wire loop. Healing normal.	$\frac{15}{40}$			Fundus perfectly clear. Irregularity in distribution of pigment.
16	Manuel A. de la Fuente. 68 yrs. Good.	Mature. Durat. 5 yrs. R. E.	Simple extr. Healing normal.	$\frac{15}{60}$	Disc.	$\frac{15}{20}$	
17	Pedro Padron. 67 yrs. Loss of pat. reflex. Beriberi. (Chinaman.)	Mature. R. E.	Extr. w. Irid. Loss of vitr. Extr. w. wire loop. Healing normal.	$\frac{15}{30}$			Irid. to facil. extr.
18	Blas Blanco. 80 yrs. Good. (Negro.)	Mature. Durat. 5 yrs. L. E.	Simple extr. Lens expelled in capsule (imperf. cystotomy), mod. loss of vitr. Healing normal.	$\frac{20}{100}$			
19	Ignacio A. Rodriguez. 53 yrs. Good.	Almost mature. Durat. 1 yr. L. E.	Extr. w. Irid. Loss of vitr. Extr. by ext. manipul. Loss of consid. vitr. Healing: slight iritis.	$\frac{15}{200}$	Disc.	$\frac{15}{40}$	Irid. after loss of vitr. to facil. extr.
20	José Lopez. 51 yrs. Good.	Morgagnian. Durat. 2 yrs. L. E.	Extr. w. Irid. Healing normal.	$\frac{15}{60}$	Disc.	$\frac{15}{20}$	Iris injured in section.
21	Laureano Arce. 67 yrs. Good.	Mature. Durat. 2 yrs. R. E.	Simple extr. Healing normal.	$\frac{8}{200}$	Disc.	$\frac{15}{40}$	Still remnants in pupil after discission.
22	Antonio Poly. 24 yrs. Good.	Soft. Durat. 3 yrs. L. E.	Extr. w. Irid. 2d day large prol. of iris (traumatic). Excision. Slow closure of ant. ch.	$\frac{15}{40}$		$\frac{15}{200}$ (1 yr. later) Irid. adv.	Irid. on account of tendency to prolapse.
23	José Parrondo. 38 yrs. Good.	Mature. Durat. 4 yrs. L. E.	Extr. w. Irid. Dislocation of lens. Extr. w. wire loop. Mod. loss of vitr. Healing: moderate iritis.	$\frac{15}{40}$			Iris injured in section.
24	N. Acosta. 70 yrs. Ulcer of leg.	Mature. Durat. 3 yrs. L. E.	Extr. w. Irid. Mod. loss of vitr. Healing normal.	$\frac{15}{70}$ Estimated			Irid. to facil. extraction.
25	Manuel Fernandez. 50 yrs. Good.	Mature. R. E.	Extr. w. Irid. Extr. w. wire loop (no vitreous). Healing normal.	$\frac{15}{15}$			Irid. to facil. extraction.
26	Mariano Mondejar. 45 yrs. Good.	Mature. Durat. 4 yrs. R. E.	Simple extr. Healing normal.	$\frac{15}{60}$	Disc.	$\frac{15}{20}$	
27	Mariano Mondejar. 45 yrs. Good.	Mature. Durat. 4 yrs. R. E.	Simple extr. Mod. iritis.	$\frac{15}{70}$	Disc.	$\frac{15}{20}$	
28	Sebastian de la Torriente. 21 yrs. Good. (Negro.)	Complic. Funct. exam. normal. R. E.	Simple extr. Healing normal.	V. = O.			Detachment of retina L. E. Equatorial staphyloma. Cataract. V = O.

No.	Name—Age—Health.	Character of Cataract.	Operation—Healing.	Prim. V.	Secondary Operation.	Ult. V.	Remarks.
29	Altagracia Garcia. 21 yrs Good. (Negress.)	Soft. Complic. traumatic. R. E.	Simple extr. Lens expelled spont.; loss of vitr. Healing: central prol. of iris (traumatic).	$\frac{15}{200}$	Excision of prolapse (6 wks. after extr.).	$\frac{15}{100}$	Pt. very unruly.
30	Domingo Arozarena. 70 yrs. Good.	Hypermat. Durat. 5 yrs. L. E.	Simple extr. Slow. clos. ant. ch.	$\frac{15}{20}$	2 Disc.	$\frac{15}{20}$	Later S. fell to $\frac{15}{40}$.
31	Pedro Alonso. 58 yrs. Good.	Mature. L. E.	Simple extr. Healing normal.	$\frac{15}{20}$	Disc.	$\frac{15}{20}$	
32	M. San Ignacio. 65 yrs. Good.	Mature. Durat. 3 yrs. R. E.	Simple extr. Healing normal.	$\frac{15}{20}$	Disc.	$\frac{15}{20}$	
33	Hypolite Hagermann. 65 yrs. Good.	Mature. R. E.	Extr. w. Irid. Healing normal.	$\frac{15}{20}$			Irid. to facil. extraction.
34	Pablo Perez. 73 yrs. Good.	Mature. Durat. 3 yrs. L. E.	Simple extr. 2d day prolap. of iris (traum.). Abscission. Healing normal.	$\frac{6}{200}$			S. tested 3 wks. after extr. and pupil still filled w. remnants, probably improved.
35	Tomas Vallarin. 48 yrs. Good.	Morgagnian. Durat. 2 yrs. L. E.	Simple extr. Healing normal.	$\frac{15}{40}$ 1 yr. later: $\frac{12}{200}$	2 Disc.	$\frac{15}{40}$	
36	Agapita Perez. 62 yrs. Good.	Mature. Durat. 3 yrs. L. E.	Extr. w. Irid. Spongy iritis.	$\frac{15}{200}$	Disc. Extr.(forceps) of capsule.	$\frac{15}{80}$	Irid. to facil. expulsion.
37	Gil Blas Yanez. 42 yrs. Good. (Negro.)	Mature. Durat. 7 yrs. L. E.	Simple extr. Healing normal.	$\frac{15}{80}$			
38	Evaristo Asen. 80 yrs. Good. (Chinaman.)	Mature. R. E.	Extr. w. Irid. Healing normal.	$\frac{20}{60}$ Estimated			Irid. to facil. expulsion.
39	Manuel Garcia. 55 yrs. Good.	Mature. Durat. 3 yrs. R. E.	Simple extr. Healing normal.	$\frac{15}{20}$ 7 m's later: $\frac{15}{200}$	Disc.	$\frac{15}{80}$	
40	Luis Quintero. 56 yrs. Good.	Mature. Durat. 3 yrs. L. E.	Simple extr. Healing normal.	$\frac{15}{100}$	Disc.	$\frac{15}{40}$	Media clear. Partial atrophy of O. N. temporal quatr. (toxic).
41	Antonio Ferrer. 70 yrs. Good.	Mature. Durat. 6 yrs. L. E.	Simple extr. Healing normal.	$\frac{15}{20}$		$\frac{15}{20}$ 2 yrs. later	
42	Joaquin Menendez. 68 yrs. Good.	Mature. Durat. $1\frac{1}{2}$ yrs. R. E.	Simple extr. Laborious. Slow closure of ant. ch. Severe iritis.	$\frac{15}{60}$ Later: $\frac{15}{100}$	2 Disc.	$\frac{15}{200}$	1 yr. after extr. severe iritis. Recovery. V. $\frac{15}{200}$. L. E. lost, plastic cyclitis after extr. by brother oculist.

43	Francisco Berges. 70 yrs. Good.	Mature. R. E.	Extr. w. Irid. Slow closure of ant. ch.	$\frac{8}{200}$	2 Disc.	$\frac{20}{200}$	Slight improvement in S. due to dense sec. capsule. Iridotomy adv. Irid. to facil. extraction.
44	Pedro Bernal. 79 yrs. Good.	Mature. Durat. 3 yrs. R. E.	Simple extr. Slow closure of ant. ch.	$\frac{1}{10}$	Disc.	$\frac{1}{10}$	
45	José Garcia Acabal. 55 yrs. Good.	Mature. Durat. 1½ yrs. L. E.	Simple extr. 2d day large prol. of iris. Excis. Spongy iritis.	$\frac{1}{10}$	Disc.	$\frac{1}{10}$	
46	Tomas Corona. 55 yrs. Good.	Mature. Chronic trachoma. Corn. opacities. Durat. 2 yrs. L. E.	Extr. w. Irid. Extr. w. wire loop. Loss of vitr. Healing: purulent iritis. Plastic cyclitis.	V. = O.			Irid. to facil. extraction.
47	M. San Bernardino. 60 yrs. Good.	Mature. Durat. 4 yrs. L. E.	Simple extr. Healing normal.	$\frac{1}{50}$			
48	Ana Rosain. 72 yrs. Feeble, sickly.	Complicated? Durat. 3 yrs. L. E.	Extr. w. Irid. Extr. of part of nucleus w. wire loop. Remainder dislocated upwards. Loss of vitr. Plastic iritis, closure of pupil.	P. of L.	Iridectomy.	$\frac{6}{200}$	Irid. to facil. expulsion. Light during operation very poor. Immed. after irid. obtained better S. but opening closed by plastic exudate. R. E. operated by brother oculist sev. yrs. before. Cataract left in eye. (Subluxation.) Phthisis bulbi.
49	Sixto Rodriguez. 59 yrs. Good. (Negro.)	Complic. Durat. 1½ yrs. L. E.	Extr. w. Irid. Lens dislocated upwards. Extr. in capsule. Healing normal.	$\frac{20}{40}$			Irid. to facil. expulsion. Keratoglobus. Cornea very thin, crumpled like paper immed. after section.
50	Sixto Rodriguez. 59 yrs. Good. (Negro.)	Complic. Durat. 1½ yrs. R. E.	Simple extr. Healing normal.	$\frac{20}{40}$			Kerato-globus. Cornea very thin, crumpled like paper immed. after section.
51	Francisco Porras. 45 yrs. Good.	Complic. traumatic. R. E.	Extr. after prelim. Irid. Loss of vitr. Partial collapse of globe. Extr. w. wire loop. Healing normal.	$\frac{10}{200}$	Disc.	$\frac{4}{200}$	L. E. Detachment of retina.
52	Manuel Panades. 52 yrs. Good.	Mature. Durat. 5 yrs. L. E.	Ext. w. Irid.; w. wire loop. Loss of vitr. Healing: plastic iritis, closure of pupil.	V. = Mov. of Hds.	2 Iridectomies. 1 Iridotomy.	V. = Mov. of Hds.	Irid. to facil. extr. Openings in iris of sec. operation immed. closed by plastic exudate.
53	Francisco Hernandez. 75 yrs. Good. (Negress.)	Mature. Durat. 3 yrs. R. E.	Simple extr. Healing normal.	$\frac{20}{40}$			
54	Merced Gonzalez. 60 yrs. Good. (Mulatto.)	Mature. L. E.	Extr. w. Irid. Iridodialysis. Healing: ang. incarc.	$\frac{1}{10}$			Irid. on account of tendency to prolapse.

No.	Name—Age—Health.	Character of Cataract.	Operation—Healing.	Prim. V.	Secondary Operation.	Ult. V.	Remarks.
55	José Lopez. 53 yrs. Good.	Morgagnian. Durat. 3 yrs. R. E.	Simple extr. Slow closure of wound.	$\frac{1}{60}$			
56	Francisco Hernandez. 75 yrs. Good. (Negress.)	Mature. Durat. 2 yrs. L. E.	Extr. w. Irid. Healing normal.	$\frac{1}{10}$ Estimated			Irid. to facil. expulsion.
57	Nazario el Tuerto. 35 yrs. Good.	Complic. traumatic. Durat. 20 yrs. L. E.	Extr. w. Irid. Loss of vitr. Extr. w. wire loop. Healing normal.	$\frac{6}{200}$ Sec. Cat. Disc. Advised.			Irid. to facil. extraction.
58	M. Natividad. 70 yrs. Good.	Mature. Durat. 7 yrs. R. E.	Simple extr. Healing normal.	$\frac{1}{60}$			
59	Luis Quintero. 57 yrs. Good.	Mature. Durat. 2 yrs. R. E.	Simple extr. Healing normal.	$\frac{1}{200}$	Disc.	$\frac{1}{10}$	Media clear. Partial atrophy of O. N. toxic.
60	Edita Martinez. 25 yrs. Anæmic.	Soft. Complicated. Durat. 1½ yrs. L. E.	Simple extr. Healing normal.	$\frac{6}{200}$			Atrophic choroiditis.
61	Manuel A. de la Fuente. 70 yrs. Good.	Mature. L. E.	Simple extr. Healing normal.	$\frac{1}{200}$			
62	Carlota Nunez. 63 yrs. Good.	Mature. Durat. 4 yrs. L. E.	Simple extr. 2d day central prolapse. Excision. Healing normal.	$\frac{1}{10}$			
63	Carlota Nunez. 63 yrs. Good.	Mature. Durat. 3 yrs. R. E.	Extr. w. Irid. Extr. w. wire loop (no vitreous). Healing normal.	$\frac{1}{60}$			Irid. to facil. extraction.
64	Dolores Valdes. 80 yrs. Good. (Negress.)	Mature. R. E.	Extr. w. Irid. Collapse of cornea. Extr. w. wire loop (no vitreous). Healing normal.	$\frac{1}{60}$ Estimated			Irid. to facil. extraction. Excessive hypotony.
65	Martina Trujillo. 74 yrs. Good.	Hypermature. Durat. 10 yrs. L. E.	Simple extr. Healing normal.	$\frac{20}{200}$			
66	Dolores Valdes. 80 yrs. Good. (Negress.)	Mature. L. E.	Extr. w. Irid. Collapse of cornea. Extr. w. wire loop (no vitr.). Healing: infection of wd. Cauterized w. red-hot probe. Partial supp. of cornea. Closure of pupil.	V. = Mov. of Hds.			Irid. to facil. extraction. Excessive hypotony. Would possibly benefit by iridotomy.
67	Fernando de Herrera. 56 yrs. Good.	Mature. Durat. 3 yrs. L. E.	Simple extr. Slow closure of ant. ch.	$\frac{1}{10}$ Sec. Cat. Disc. Adv.			
68	Julian Delgado. 50 yrs. Good.	Mature. Durat. 3 yrs. L. E.	Simple extr. Healing normal.	$\frac{1}{10}$			
69	Francisco Ramos Almeyda. 83 yrs. Urine = alb.	Mature. Durat. 4 yrs. L. E.	Extr. w. Irid. Extr. w. wire loop (no vitr.).	$\frac{1}{10}$	Disc.	$\frac{1}{20}$	Irid. to facil. extraction.

70	Manuel Fernandez. 51 yrs. Good.	Mature. Durat. 3 yrs. L. E.	Simple extr. Loss of vitr. Healing normal.	$\frac{15}{40}$			
71	Rafael Garcia. 60 yrs. Good.	Mature. Durat. 2 yrs. R. E.	Simple extr. Healing normal.	$\frac{15}{30}$			
72	Juana Moran. 70 yrs. Good.	Complic. Durat. 2 yrs. R. E.	Extr. w. Irid. Loss of vitr. Extr. w. wire loop. Healing normal.	$\frac{15}{200}$			Corneal opacities, old iritic adhesions. Irid. to facil. extraction.
73	Rafael Garcia. 60 yrs. Good.	Mature. Durat. 1½ yrs. L. E.	Simple extr. Healing normal.	$\frac{20}{40}$			
74	Manuel Serrano. 59 yrs. Good.	Almost mature. Durat. 1 yr. R. E.	Simple extr. Healing normal.	$\frac{15}{60}$ Later: $\frac{15}{70}$	Disc.	$\frac{15}{40}$	
75	Tomas Vallarin. 45 yrs. Good.	Mature. Durat. 2 yrs. L. E.	Simple extr. Slow clos. ant. ch.	$\frac{15}{70}$	Disc.	$\frac{15}{60}$	
76	H. Bosselmann. 58 yrs. Good.	Complic. (myopia). Durat. 3 yrs. R. E.	Extr. w. Irid. Extr. w. wire loop. Loss of vitr. Healing: mod. iritis.	$\frac{15}{70}$	Disc.	$\frac{15}{70}$	Irid. to facil. extr. 1 yr. after extr. severe iritis. V. reduced to $\frac{1}{200}$. Recovery w. V. = $\frac{15}{70}+$.
77	Merced Gonzalez. 60 yrs. Good. (Mulatto.)	Morgagnian. R. E.	Simple extr. 5th day sm. central prolapse (traumatic).	$\frac{15}{100}$			
78	José Ramon Gonzalez. 59 yrs. Good.	Almost mature. Durat. 1 yr. R. E.	Extr. w. Irid. Extr. w. wire loop. Slight loss of vitr. Healing normal.	$\frac{15}{200}$	Disc.	$\frac{20}{60}$	Irid. to facil. extraction.
79	N. Portocarrero. 70 yrs. Good.	Mature. Durat. 4 yrs. L. E.	Simple extr. Loss of vitr. Extr. w. wire loop. 6 hrs. after extr. severe choroidal hge. No. infl., no supp. Phthisis bulbi.	V. = O.			R. E. operated by brother oculist, several years before, also lost by intraoc. hge.
80	José Maria Suarez. 23 yrs. Good.	Complic. traumatic. P. of L. in upper V. F. obscure. Durat. 1 yr. R. E.	Extr. w. Irid. Extr. w. wire loop (no vitr.). Healing normal.	V. = P. of L. Remnants in pupil.			2 previous disc. Irid. to facil. extraction.
81	Mariana Barrero. 61 yrs. Good.	Mature. Durat. 2 yrs. R. E.	Extr. w. Irid. Extr. w. wire loop (no vitr.). Healing: iritis.	$\frac{15}{40}$			
82	Nicolas Matoran. 54 yrs. Heart disease. Urine=alb.	Mature. Durat. 3½ yrs. R. E.	Simple extr. Healing normal.	$\frac{15}{70}$ Estimated			Pt. died of ht. disease 4 wks. after extr., before testings. Wd. healed. Useful S.
83	Antonio de la Piedra. Urine=alb.	Mature. Durat. 3 yrs. L. E.	Extr. w. Irid. 1st ineffect. attempt at extr., luxated lens upwards. Loss of vitr. Plastic iritis. 14 days after, extr. w. wire loop (easy). Corneal necrosis, panophthalmitis, phthisis bulbi.	V. = O.			During the 1st. operation very poor light. Irid. to facil. extraction.

No.	Name—Age—Health.	Character of Cataract.	Operation—Healing.	Prim. V.	Secondary Operation.	Ult. V.	Remarks.
84	Manuel Garcia. 51 yrs. Good.	Mature. Durat. 3 yrs. L. E.	Simple extr. 2d day prolapse of iris. Excision. Healing normal.	$\frac{7}{200}$	Disc.	$\frac{15}{70}$ Estimated	
85	Justo Gonzalez. 25 yrs. Good. (Negro.)	Complicated traumatic. Durat. 4 mos. R. E.	Extr. w. Irid. Healing normal.	$\frac{6}{200}$	Disc.	$\frac{20}{200}$	Irid. due to tendency to prolapse.
86	Tomasa Iduarte. 80 yrs. Good. (Negress.)	Mature. R. E.	Simple extr. Healing normal.	$\frac{15}{40}$			
87	Andres Vento. 60 yrs. Good.	Mature. Durat. 3 yrs. L. E.	Extr. w. Irid. Loss of vitr. Extr. w. wire loop. Healing: incarc. of iris.	$\frac{15}{70}$			Irid. to facil. extraction.
88	Tomasa Iduarte. 80 yrs. Good. (Negress.)	Mature. L. E.	Simple extr. Healing normal.	$\frac{6}{200}$ Disc. adv.			
89	Serapio Martin. 51 yrs. Good.	Mature. Durat. 2 yrs. L. E.	Simple extr. Healing normal.	$\frac{15}{40}$			
90	Martin G. Setuein. 65 yrs. Good.	Morgagnian. Durat. 4 years. R. E.	Simple extr. Healing normal.	$\frac{15}{70}$ Estimated			
91	M. Sta. Gertrudis. 83 yrs. Good.	Mature. Durat. 5 yrs. R. E.	Extr. w. Irid. Incarc. of iris.	$\frac{15}{200}$	Disc.	$\frac{15}{200}$	Irid. on account of tendency to prolapse.
92	Martinez Valdivieso. Good.	Mature. Durat. 5 yrs. L. E.	Simple extr. Healing normal.	$\frac{15}{30}$			
93	Pedro Almuedo. 68 yrs. Good.	Mature. Durat. 4 yrs. R. E.	Simple extr. Slow clos. ant. ch.	$\frac{15}{40}$			
94	Maria Dominguez. 63 yrs. Good.	Complicated. R. E.	Extr. w. Irid. Extr. w. wire loop (no vitr.).	$\frac{15}{70}$ Estimated			Irid. to facil. extraction.
95	Nieve Rodriguez. 51 yrs. Good.	Morgagnian. Durat. 4 yrs. R. E.	Simple extr. Healing normal.	$\frac{15}{70}$	Disc.	$\frac{15}{30}$	
96	Mauricio Rosell. 73 yrs. Good. (Negro.)	Complicated. L. E.	Simple extr. 2d day prolapse. Excis. Healing: iritis, closure of pupil.	V. = Mov. of Hds.	Disc.	$\frac{4}{200}$	Media clear. Nerve cupped? R. E. cataract glaucoma. V. = O.
97	Eduvigis Gonzalez. 68 yrs. Good.	Mature. R. E.	Simple extr. Healing normal.	$\frac{20}{40}$			
98	Caridad Garriga. 58 yrs. Good.	Mature. Durat. 2 yrs. R. E.	Simple extr. 2d day prolapse. Excis. Healing normal.	$\frac{15}{30}$			
99	Ignacio Lopez. 59 yrs. Good.	Complic. Glaucoma. Proj. poor. Durat. 7 yrs. R. E.	Extr. w. Irid. Loss of vitr. Profuse hge. Healing normal.	V. = O.			Irid. to facil. extraction.
100	Antonio Ruiz. 58 yrs. Good.	Mature. R. E.	Simple extr. Healing normal.	$\frac{20}{40}$			

A CASE OF ANGIOMA ORBITÆ FIBROSUM.

By Dr. ERNST NEESE, Kiew.

(*With three figures on Plate II. of Vol. XXXV., Germ. Edition.*)

Translated by Dr. Ward A. Holden.

Nov. 20, 1896, I received into the hospital a farmer of twenty-four, who was apparently healthy. His right eye was pressed forward out of the orbit by a globular tumor as large as a small apple, on the anterior surface of which the eye rested. The cornea, anterior chamber, and pupil were of normal appearance, the media were clear, and the optic disc presented the ophthalmoscopic picture of atrophy of the nerve, which explained the complete blindness. The axis of the protruding eye was turned toward the nose, the tumor having presented more to the outer side. The active mobility of the eye was abolished. The tumor filled the entire orbit, touching the orbital margin on every side, and its anterior pole protruded about one centimetre. The upper lid which partially covered the tumor was greatly stretched and showed a considerable development of vessels. The surface of the tumor was flattened and somewhat nodular. In consistency it was elastic but too hard to be compressible. Neither pulsation nor alteration of volume could be detected, and the tumor could be but slightly moved up and down and to the right and left.

The growth had developed, without any known cause, very gradually for several years. There has never been any pain, and except for the deformity the patient suffered no inconvenience.

A clinical diagnosis was made of fibroma of the orbit within the muscle funnel, behind and external to the eyeball, and removal was advised, to which the patient readily consented. Under the circumstances there was no possible chance of saving the eyeball.

Dec. 4th.—The operation was done under chloroform with the

assistance of Dr. Botscharoff, of the surgical clinic. After elevating the upper lid with hooks, the mucous membrane along the retrotarsal fold and the orbital margin was divided first above and then below. Then with the fingers and the blunt points of the scissors the tumor was separated from the orbital wall to which it was not tightly adherent. Finally the optic nerve was divided and the tumor shelled out without much difficulty, from which fact one could conclude that it had developed exclusively in the cellular tissues. The orbit filled with granulation tissue and the course of healing was uncomplicated. The further history of the patient is unknown to me.

The spherical tumor with the ball was put into Müller's fluid and examined a year after. When divided in half, the tumor measured 5–6 *cm* in antero-posterior diameter, and 4–5 *cm* in its shortest diameter, from side to side (Fig. 1, Plate II.). It lay to the outer side of the ball and optic nerve, flattening the former. The entire tumor is surrounded by a capsule, and this explains the ease with which it was separated from the walls of the orbit. In sections, the structure of the tumor appears sponge-like or cavernous, the cavities being larger and closer together in the centre of the tumor. In places the cavities are only of pin-head size so that the tissue has a porous appearance. At present the cavities are empty. At some points to the naked eye the tumor appears to be a compact mass.

Microscopic examination of the growth showed a stroma of fibrous or fibrillar tissue, with many elongated nuclei, in which were vessels of different sizes. In some sections (Fig. 2, Pl. II.) these vessels appear as great distended cavities with traces of an endothelial lining (Fig. 2, *e*). Some of the cavities contain blood corpuscles, so there is no question as to their nature. The predominance of fibrous stroma over vessels (Fig. 3), which was indicated by the hardness of the tumor, justifies us in calling the growth a fibrous variety of angioma.

The angiomatous neoplasms of the orbit first attracted the attention of Travers and of Dalrymple. Later the number of observations increased, and with this skepticism arose as to whether the authors were really dealing with true cavernous tumors and not perhaps with ordinary aneurisms, since the reports were mostly of a clinical nature exclusively and but rarely supported by careful pathological

examinations, and since the deep location of the tumor in the orbit made an absolute clinical diagnosis difficult.

Nunneley and Hulke, therefore, in 1859, went so far as to deny the existence of orbital angioma altogether, and to attribute the exophthalmus, pulsation, and bruit to aneurism within the cranial cavity, carcinoma and thrombosis of the cavernous sinus, and the like, supporting their views by original observations.

Virchow did not question the occurrence of true orbital angioma, and he described, among other cases, one in which a congenital tumor was removed by Dieffenbach from beneath the upper lid of a man of twenty-four and examined microscopically by Lebert.

Still the first case of cavernous angioma of the orbit to be examined carefully, both clinically and pathologically, was described by von Graefe, and mentioned particularly by Virchow, in *Die krankhaften Geschwülste* (p. 331, fig. 232). The patient was a man of fifty-five, otherwise healthy, who had noticed for eight years the gradual painless development of an elastic compressible tumor deep in the orbit within the muscle funnel, which at first, from time to time, caused exophthalmus with strangulation of the ball, and later caused protrusion of the ball almost daily. Von Graefe remarked that with a tumor of this sort its spontaneous swelling and shrinking was of great diagnostic importance, since the same symptoms could be produced artificially by checking the circulation mechanically. Graefe called attention, further, to the tense elastic, but never hard, consistency, the almost completely preserved play of the ocular muscles, the location in the fatty tissue of the orbit, the very slow growth, the painlessness, and, finally, the good general condition of the patient; and he asks which of these signs will in the future be found to be characteristic of cavernous tumors of the orbit, and which not.

After this classic description by von Graefe we should mention the cases of de Wecker, Maury, and Horner, which were carefully examined both clinically and pathologically. In de Wecker's case the growth was due to an injury received from a shuttle fourteen years before. The ball, which

protruded about one centimetre, was almost motionless. The tumor was removed with preservation of the ball, but not much mobility was obtained. The microscopic examination was made by Cornil.

In Maury's case the exophthalmus had begun fifteen years before, and the equator of the ball now lay anterior to the margin of the orbit. The mobility of the ball was somewhat restricted, particularly outward. There was never observed any change in the volume of the tumor, which had developed at the outer wall of the orbit, and had penetrated the muscle funnel between the external and inferior recti. The microscopic examination was made by Maier.

In Horner's case the tumor developed gradually behind a blind and squinting eye. Here the mobility was entirely preserved, and pressure on the tumor caused an alteration in size. The tumor lay within the muscle funnel, and consisted of two parts. The microscopic examination was made by Eberth.

Less accurately described, about the same time, was a case by Holmes. Here there were pronounced exophthalmus, almost complete loss of mobility, and displacement of the ball downward and inward. The tumor was quite hard, and had developed in eighteen months to such a degree that it filled the entire outer half of the orbit. The tumor was extirpated with preservation of the eye. The anatomical examination showed small cavities filled with blood and separated by very thin walls, the structure resembling that of the corpus cavernosum.

Knapp's case in an infant ten weeks old, in which the anterior portion of the tumor showed alterations in volume, is of interest to us because the posterior portion of the tumor showed, as in our case, the structure of a fibrous angioma. In a later case (1896) reported by Knapp, the tumor lay within the muscle funnel at the apex of the orbit, whence it was removed with preservation of the ball. The ball was slightly displaced inward and downward, the mobility was almost normal, and changes of volume in the tumor could not be made out.

A palpable swelling of the tumor, which had developed

for fourteen years within the muscle funnel of a patient of seventy-six, was observed in Mauthner's case. Here also the growth was removed with preservation of the ball. In this case all the symptoms found by von Graefe were present except lack of pain, but the pain was slight and not constant.

Another case reported by Ahrens is interesting, because the tumor, which had developed during four years, lay entirely outside the muscle funnel between the ball and the inner-lower margin of the orbit. There was no exophthalmus, but all the rest of von Graefe's symptoms were present. The enucleation and the pathological examination were made by Zehender.

A case reported by Gosetti was less satisfactory from a pathological view-point, although the clinical report was good. Here a hard, elastic, and but slightly compressible tumor, that did not swell up and was not painful, developed in the depth of the orbit of a man of sixty, in the course of seven years. The mobility of the ball was slightly restricted outward and inward. The extirpation of the tumor was done with preservation of the ball. The tumor was surrounded by a dense fibrous capsule, and was called by Paganuzzi an "angioma simplex."

More detailed in its pathological but briefer in its clinical aspect was the report of von Brincken. His patient was two years and a half old, and enucleation of the ball was necessary. The microscopic report of the fan-like, cavernous tumor with endothelial membranes was made by Professor Neelsen.

Rather original was the case reported by Peyrot. In a girl of twenty-three there had developed during six or seven years a tumor of the orbit so extensive that nothing could be seen of the eye. The tumor was removed entire, and after tedious suppuration and an erysipelas there was recovery. Poncet examined the tumor microscopically, could find no trace of eyeball, and designated the tumor as a cavernous melanotic fibroma. This diagnosis was questioned by Berlin, because the complete destruction of the ball suggested rather a tumor which had originated in the eyeball itself. Several months later the patient came to

Panas, with pain in the operated orbit and beginning sympathetic ophthalmia. It now appeared that the phthisical and painful eyeball remained in the depth of the orbit. After removal of the ball, the sympathetic disturbance passed off, and Berlin no longer questioned the original diagnosis.

Forty other cases have been reported, some in less detail, others imperfectly, and others again in which the diagnosis was questionable. The authors' names and references are given in the bibliography at the end of the paper.

Among the cases cited, the vascular tumors of the orbit may be divided into the simple and the cavernous angiomas. Tumors of the first sort are easily recognized, since they stand in more or less apparent connection with dilated vessels on the surface of the lids or neighboring parts. The only exception would be the case of Gosetti, in which what was called an "angioma simplex" was found in the depth of the orbit without any connection with the surface. Such a location, more or less deep in the orbital cellular tissue, and independence of superficial vascular trunks, are characteristic of the cavernous variety of angioma.

Taking into consideration these cases, and chiefly the first case of von Graefe's, Berlin attempted to sketch the clinical picture of cavernous angioma of the orbit.

One of the important signs is its *painlessness*, in which it differs markedly from all malignant tumors of the orbit. In Horner's case alone was pain complained of, and this had appeared only in the last two years, while the tumor had existed without causing pain for fourteen years. In Mauthner's case also there was moderate pain, but only at intervals.

A second sign is the exceeding *slowness of growth*. Thus in Ahrens's case the tumor had developed for four years; in the case of Peyrot and in that of Gosetti from six to seven years; in von Graefe's case eleven years; in Knapp's case twelve years; in the case of Mauthner and in that of de Wecker fourteen years; in Manz's case fifteen years; in Horner's case sixteen years; and in Ricci's case even nineteen years.

The *mobility of the eye* and the free play of the muscle are practically preserved in all cases, and in only a few is there diminished mobility in a particular direction corresponding to the location of the tumor, and in de Wecker's case alone was there almost complete immobility.

Another sign is the *elastic consistency* of the tumor, although its actual hardness varies. Thus in von Graefe's case it was tense but not hard; in Ahrens's case tense and elastic like the corpus cavernosum; in the case of de Wecker and in that of Horner soft; in one of Knapp's cases resistant but soft, and in the other case rather hard; in Mauthner's case soft but at times harder. Only in Gosetti's case, in which he called the tumor a simple angioma, was it "consistent" but elastic; while in Story's case, in which the tumor proved to contain a phlebolith, it was as hard as stone.

Another sign is the *compressibility* of the tumor. This was especially noted in Horner's, Knapp's, Samelsohn's, and Gussenbauer's cases.

The most characteristic peculiarity of cavernous angioma, however, is its *tendency to swell* under the influence of venous stasis. This symptom was noted by von Graefe, Horner, Knapp, Mauthner, Samelsohn, Story, and others.

A less constant symptom is the mobility of the growth. In Horner's, Samelsohn's, and Ahrens's cases this was noticed, while in Knapp's first case, on the contrary, the growth was adherent to the wall of the orbit.

Finally, *good general health* has existed in every case.

If we now return to our own case, it will be seen that in spite of its angiomatous character it lacked many of the characteristic symptoms, and clinically differed considerably from both the simple and the cavernous angiomas.

Thus though elastic it was almost as hard as cartilage and it was almost incompressible. Such hardness is not found in angiomatous tumors as a rule. There was no swelling from venous stasis, as is common; but this was explained by the predominance of fibrous tissue in the tumor. The fibrous variety of angioma is very rare, since Knapp's case alone of the many reported had the structure of fibrous angioma, and this only in one part of the growth. It is possible that

Gosetti's case, though called simple angioma, would properly belong in this category.

Of the other usual symptoms that were lacking were the free play of the muscles and the unrestricted mobility of the ball. This also can be explained by the hardness of the tumor, which doubtless stretched the extrinsic muscles and brought about their atrophy. There was only a certain degree of passive mobility remaining to the tumor, which was enclosed in a capsule and hence loosely attached to the orbital walls.

Thus in our case there remain of the characteristic symptoms only the painlessness, the slow growth, and the good general health.

In its clinical aspects our tumor resembled in some degree a particular variety of angioma—cavernous lymphangioma of the orbit. This is an extremely rare form of orbital tumor and Berlin doubted its existence. There have been but three cases reported, one by Forster, one by Wiesner, and one by Ayres.[1] In Wiesner's case, at least, the consistency of the tumor was hard and there was no transitory swelling. The play of the muscles was greatly restricted in all directions in Forster's case, the tumor lying within the muscle funnel; it was restricted downward in Wiesner's case, the tumor lying between the periosteum and the muscle funnel. Painlessness, slow growth, and good general health existed in all three.

The hardness of our tumor, with the clinical signs of benignity, led us to make a clinical diagnosis of fibroma. This was done in many of the other cases reported. The differential points would be the slower growth of angioma and its almost exclusive location within the muscle funnel.

BIBLIOGRAPHY.

1. Benj. Travers, *Med. Chir. Transact.*, 1813, vol. ii., p. 1.
2. J. Dalrymple, *Ibid.*, 1815, vol. vi., p. 111.
3. Th. Nunneley, *Ibid.*, 1859, vol. xlii., p. 168, and 1865, vol. xlviii., p. 14.
4. John Hulke, *Ophth. Hosp. Reports*, 1859, April, p. 10.
5. Rud. Virchow, *Die krankhaften Geschwülste*, Berlin, 1863, p. 358.

[1] A case has been reported by Wintersteiner, *Graefe's Archiv*, xlv., p. 613, since this article was written.—Trans.

6. HERM. LEBERT, *Abhandlungen aus dem Gebiete der practischen Chirurgie*, Berlin, 1848, p. 88.
7. ALBR. V. GRÄFE, *Arch. f. Ophth.*, vii., 2, p. 11.
8. L. V. WECKER, *Klin. Monatsbl. f. Augenheilk.*, 1868.
9. W. MANZ, "Tumor cavernosus der Orbita." *Ibid.*, p. 182.
10. FR. HORNER, "Pigmentirtes cavernöses Angiom der Orbita." *Ibid.*, 1871, p. 18.
11. EDW. L. HOLMES, *Chicago Med. Jour.*, January, 1871, xxviii.
12. H. KNAPP, *Arch. f. Augen- und Ohrenheilk.*, vi., 1, 1877, p. 43.
13. H. KNAPP, *Arch. f. Augenheilk.*, xxxii., 4, p. 271.
14. L. MAUTHNER, *Wiener med. Presse*, Nos. 1, 2, 3, 5, und 7, 1878.
15. R. AHRENS, *Klin. Monatsbl. f. Augenheilk.*, xxvii., 1889, p. 460.
16. GOSETTI, *Annali di ottalmologia*, vii., p. 265, 1878.
17. V. BRINCKEN, *Klin. Monatsbl. f. Augenheilk.*, 1884, p. 129.
18. PEYROT, *Bull. et mém. de la soc. de chir.*, viii., 1882.
19. R. BERLIN, "Nagel-Michel's Jahresbericht über die Leistungen und Fortschritte im Gebiete der Ophth. f. d. J. 1881." *Krankh. d. Orb.*, p. 506.
19a. PH. PANAS, *Arch. d'ophtalmolog.*, 1883, p. 1.
19b. R. BERLIN, "Nagel-Michel's Jahresbericht über die Leistungen und Fortschritte im Gebiete der Ophth. f. d. J. 1883." *Krankh. d. Orb.*, p. 566.
20. RÉMY, *Bull. de la soc. anatom.*, 1874.
21. RUVIOLI, *Annali di ottalmol.*, iv., 1875, p. 364.
22. ROB. CARTER, *Lancet*, Dec. 4, 1875.
23. G. E. FROTHINGHAM, *Am. Jour. of the Med. Sci.*, cxlv., 1877.
24. J. SAMELSOHN, *Berl. klin. Wochenschrift*, 1880, p. 13.
25. CAMUSET, *Gaz. d'opht.*, iv., p. 467.
26. PH. PANAS, *Arch. d'opht.*, 1883, p. 1.
27. C. GUSSENBAUER, *Wien. med. Wochenschrift*, 1883, No. 9.
28. V. DUYSE, *Angiome simple de l'orbite avec concrétions phlebolitiques.* Gand, Vanderhagen, 1884.
29. H. R. STORY, *Ophth. Review*, iii., 1884, p. 245.
30. TH. BILLROTH, *Chirurgische Klin.*, Wien, 1870-76, p. 101, 1879.
31. N. FEUER, *Pest. med. chirurg. Presse und Prager med. Wochenschrift*, 1893, No. 14.
32. A. V. GRÄFE, *Arch. f. Ophth.*, xii., p. 222, 1866.
33. SP. WATSON, *Brit. Med. Jour.*, May 31, 1873.
34. G. BRAUN, *Annal. d. chir. Gesellschaft in Moscau* (russ.), 1875, p. 418.
35. E. GRÜNING, *Arch. f. Augen- u. Ohrenheilk.*, iii., 1873.
36. VIEUSSE, *Rec. de mém. de med. militaire*, 1878, *und Rec. d'opht.*, p. 314.
37. EM. H. MARTIN, *Annales d'oculistique*, *T.* 82, p. 48.
38. H. MAGNUS, *Klin. Monatsbl. f. Augenheilk.*, p. 62, 1884.
39. S. FIALKOWSKY, *Westnik oftalmologii*, 1884, p. 260.
39a. W. DOLSHENKOW, *Ibid.*, 1886, p. 472.
40. I. ISRAEL, *Deutsche med. Wochenschrift*, 1891, No. 51.
41. E. BOCK, *Centralbl. f. pr. Augenheilk.*, Sept., 1892, p. 261.
42. SOLER, *El Siglo medico*, No. 332, Maggio, 1860.
43. MAZEL, *Union médical*, 27, fevrier, 1861, p. 163.
44. HODGES, *Boston Med. and Surg. Jour.*, vol. lxxi., p. 417.
45. V. KEMPF, *Allg. Wiener med. Zeitung*, ix., p. 17, 1864.

46. RICCI, *Dublin Journal*, xi., p. 318, 1865.
47. H. KÜCHLER, *Deutsche Klinik*, 17, 18, 19, 21, 23, 27, 28, p. 213, 1866.
48. MORTON, *Am. Jour. of Med. Science*, July, 1870, p. 43.
49. NARKIEWICZ-JODKO, *Gazeta lekarska*, p. 760 u. 792, 1871.
50. JEAFFRESON, *Ophth. Hosp. Reports*, vii., p. 187.
51. G. L. LAWSON, *Lancet*, i., p. 116, 1871.
52. VAN SANTEN, *Tijdschrift v. Geneesk.*, Afd. i., No. 3, 1872.
53. KEMPERDICK, *Arch. f. klin. Chirurgie*, xvi., p. 575.
54. ÉLOUI, *Arch. d'opht.*, 1882.
55. CAPDEVILLE, *Marseille médical*, 1882, p. 5.
56. GALLENGA, *Giorn. Acad. R. di Med.*, Torino, 1882, p. 382.
57. SNELL, *Lancet*, 1886, p. 163.
58. BRUNSCHWIG, *Arch. d'opht.*, Paris, 1889, p. 419.
59. PH. PANAS, *Progrès médical*, 1891, p. 279.
60. SERGENT, *Gaz. des hôpit.*, No. 66, Société de biologie, séance du 11 Janv. *Compt. rend.*, Soc. de biol., Paris, v., p. 153.
61. R. BERLIN, "Krankheiten d. Orbita," i. *Handb. d. ges. Augenheilk.*, v. Gräfe und Sæmisch, 1880.
62. S. v. FORSTER, *v. Gräfe's Arch. f. Ophth.*, xxiv., 2, p. 107, Fall 6.
63. B. WIESNER, *Ibid.*, xxxii., 2, p. 205.
64. FR. HORNER, *Klin. Monatsbl. f. Augenheilk.*, ix., p. 15, 1871.
65. ALB. MOOREN, *Ophthalmiatrische Beobachtungen*, p. 40, Berlin, 1867.

Explanation of the Figures.

Fig. 1. Horizontal section through the tumor and the right eyeball. Natural size. *T*, tumor; *A*, lower segment of the ball; *N*, optic nerve.

Fig. 2. Microscopic section of the tumor. Hematoxylin stain. Zeiss obj. a., oc. 3. *e*, endothelial layer.

Fig. 3. Microscopic section of another part of the tumor. Hematoxylin stain. Zeiss obj. a., oc. 3.

ON FIBROMA OF THE CORNEAL LIMBUS IN SPRING CATARRH.[1]

By Dr. HANS SCHLUB.

(With five figures on Plates IV.–V. of Vol. XXXV., German Edition.)

Abridged Translation by Dr. Ward A. Holden.

INTRODUCTION.

SPRING catarrh of the conjunctiva is not common, and only in the last twenty-five years has it been recognized and described as a distinct disease. Nevertheless there are to be found in literature a great number of papers on the subject. It is described as an affection of the palpebral conjunctiva and of the limbus of the conjunctiva, which affects particularly males in the first two decades of life, recurs year after year in the warm season, is not improved by treatment, and finally passes off permanently without leaving scars.

Sæmisch christened the disease spring catarrh, and this name appeared first in a dissertation by Brockhaus, a pupil of Sæmisch's. Before this, what was probably the same disease had been mentioned under other names, with the consideration of other symptoms, by Arlt, von Graefe, Desmarres, and de Wecker. More than a dozen names have been suggested since, without finding general acceptance. While the earlier descriptions were of the changes at the limbus only, the later clinical histories included also accounts of the growths on the palpebral conjunctiva, and one observer finds the thickening at the limbus — most pronounced

[1] From the laboratory of the University Eye Clinic of Professor Mellinger at Basle.

in the exposed zone — more constant, and another attaches more importance to the fungus-shaped cobble-stone-like excrescences of the conjunctiva of the upper lid. In all descriptions since this dissertation appeared, weight is laid on the fact that the disease recurs with the beginning of warm weather and passes off as the cooler season approaches.

The descriptions of the microscopic changes found in bits excised from the lid or the limbus are much more uniform than those of the clinical picture, and I wish to give a brief résumé of the reports of Camuset, Reymond, Vetsch, Horner, Uhthoff, Knus, Tailor, Schoebl, Haab, Raabe, and Burckhardt. The new growths have always been described as consisting of epithelium and connective tissue. A marked increase in the epithelial layer, which particularly at the limbus gives the new formation the character of an epithelial neoplasm, has been reported by most of the authors mentioned. The layer has been found to be so thickened that it was thirty strata of cells deep, and besides this epithelial processes have been found dipping down into the stroma and giving rise to a picture suggesting epithelioma. According to these authors, the stroma is not much increased, and at least in the new growths at the limbus plays a subordinate rôle.

Views differing from these have been expressed only by Reymond, whose specimens were imperfect, and by Burckhardt, who found that in a case observed in the Basle clinic the connective tissue was far greater in amount than the epithelium. I am now able to add the report of two similar cases from the same clinic, and for the sake of comparison Burckhardt's report is here repeated.

THREE CASES OF PRONOUNCED PROLIFERATION OF CONNECTIVE TISSUE AT THE LIMBUS IN SPRING CATARRH.

CASE I.—H. R., aged twelve, has suffered for the past two years with an inflammation of the eyes, appearing in the spring and passing off with the approach of cold weather. Lately growths have been noticed on both eyes, and the boy was brought to the clinic, presenting the following condition: R, conjunctiva of lids slightly catarrhal, but having a whitish cast, and in the upper lid there are some follicles. At the temporal margin of

the cornea is a dense elevation, as large as a small bean, with a gray, uneven surface. In the left eye smaller tumors were situated one at the nasal and one at the temporal margin of the cornea. The tumors were removed and the wounds scraped. Uneventful healing.

The bits of tissue removed, like those in the following cases, were hardened in Müller's fluid and cut in paraffin.

The tumor from the left eye was 5 *mm* long and at one end 1.5 *mm* thick, while at the other end it became thinner (Fig. 1, Plate IV.).

Slightly magnified, one saw a thick epithelial layer, with darkly stained nuclei, forming the surface of the tumor, while the bulk of the tumor, at first glance, seemed to consist of an accumulation of round cells. When carefully examined the following details could be made out. At the narrow end of the section the round cells lie close together beneath the epithelium, but lower down these are present in smaller number and take on a network-like arrangement, while the fibres of the ground substance have a wavy course. At the broad end the infiltration is more considerable. The cells lie in close groups separated by paler zones. These paler interstices consist of branching fibres—the broad trunk at the base of the tumor breaking up into small branches, which extend out to the epithelium. Between the branched tracts of fibres lie the groups of round cells mentioned above, more closely in the central portion of the tumor.

The epithelial covering plays a subordinate rôle in our preparations. Near the free surface the epithelium is laminated and has few nuclei. In the layers next beneath, the regularly arranged nuclei form a fine mosaic, while in the deepest layer the nuclei lie close together with their long axes perpendicular to the margin of the epithelium. At the margin of the tumor the epithelium is thinner and the various layers are less regularly arranged.

The subepithelial zone (Fig. 2) is composed of a fine-fibred, reticular stroma, in the meshes of which lie round cells of various sizes. In the middle zones these round cells are so thick that they almost conceal the ground substance. Only a few dense tracts of fibres, rich in spindle cells, are seen extending from the broader fibrous masses at the base of the tumor in a radiating direction toward the surface. In the flatter portion of the tumor the number of cells is less. Vessels are present only in small number.

Case 2.—T. S., aged sixteen, noticed redness and burning of

the eyes each summer for the past four years. Last year and the year before he had no trouble, but the affection returned last June, and triangular tumors appeared on each side of the cornea. The catarrhal symptoms passed off when the weather became cooler, but the nodules at the limbus remained, and were cut off. One tumor was 3 x 1 *mm* and the other 4 x 1.5 *mm*. The greatest thickness was at the end next the cornea. In the smaller tumor (Fig. 3) the epithelium is very thin over the apex of the growth, and the superficial nuclei are arranged irregularly. The inferior line of limitation is broken and epithelial processes dip down into the stroma. The stroma makes up the bulk of the tumor. It is very rich in round cells, which have a distinct reticular arrangement in some parts. The stroma consists throughout of broad fibres which curve and leave many clefts among them. The cells filling these spaces are in part darkly stained small round cells, and in part large oval cells with a lighter protoplasm and paler granules. Finally, spindle cells are seen lying among the fibres. Many small vessels are present, but there is no round-celled infiltration about them. In Fig. 4 is shown, more highly magnified, epithelial processes dipping down into the stroma.

Case 3.—P. R., aged twenty-four, has suffered every summer since his eighth year with redness of the eyes and lachrymation. Seven years ago a membrane formed on the right eye and later two on the left.

The conjunctiva of the left eye is in a state of catarrhal inflammation and the papillæ of the palpebral conjunctiva are enlarged. At the temporal margin of the cornea and overlapping it 2–3 *mm* is a flat, smooth, grayish tumor 6–8 *mm* in length, 3 *mm* in breadth, and 1 *mm* thick. At the nasal margin is a similar smaller tumor. Both tumors were dissected off.

The larger tumor examined microscopically was found to have an epithelial layer four or five cells deep, the cells being mostly spindle shaped, and lying horizontal. They are not sharply outlined from the underlying tissue. The stroma is composed of wavy fibres running parallel, with many cells in the interstices. The cells in most places are small round cells or larger oval cells with a few spindle cells among them. In other parts of the sections the subepithelial layer contains exclusively spindle cells and the underlying stratum is richer in round cells. In Fig. 5 is shown such a portion of the tumor. At the base of the tumor is a loose connective tissue belonging to the conjunctiva.

In these three cases of spring catarrh the growths at the limbus were composed of connective tissue covered with a relatively thin layer of epithelium.

All the patients were males, their ages were twelve, sixteen, and twenty-four years, and the clinical histories were characteristic. In the twelve-year-old boy the affection had lasted for two years, the sixteen-year-old boy had noticed redness of his eyes in the summer for four years, and the third patient had suffered every summer for sixteen years.

The characteristic changes in all three patients were limited to the limbus, for while the palpebral conjunctiva showed symptoms of simple catarrhal or papillary inflammation, in no case were there the fungus-shaped or cobble-stone-like elevations in the retrotarsal fold or on the tarsal conjunctiva of the upper lid. The earlier writers mostly spoke only of the changes of the limbus in this disease, and Emmert found the disease limited to the limbus in eight out of twenty-nine patients with spring catarrh, and Knus in fifteen out of fifty-two.

The tumors, which were thickest next the cornea, were covered with epithelium and the stroma consisted of fibrous tissue with spindle cells, among which lay leucocytes and formative cells, the younger growths being more cellular and the older more fibrous. The designation fibroma, therefore, is fitting.

My thanks are due to Professor Mellinger for suggesting this study and for friendly advice during its progess.

LITERATURE.

1. Arlt, *Prager Vierteljahrsschrift*, No. 4, 1896, p. 74.

2. Brockhaus, C., "Ueber den Frühjahrskatarrh der Conjunctiva," *Diss.*, Bonn, 1872.

3. Burckhardt, O., "Beitrag zur Lehre von den Grenztumoren von Conjunctiva und Cornea," *Diss.*, Basel, 1894.

4. Camuset, G., "Sur une affection particulière de la conjonctive oculaire," *Gaz. des hôp.*, 1874, p. 307.

5. Desmarres, *Traité des maladies des yeux*, Tome ii., p. 184.

6. Emmert, E., "Frühjahrskatarrh," *Centralbl. f. prakt. Augenheilk.*, 1888, p. 71.

7. v. Graefe, *Vorträge* 1854 und 1855. *Klin. Vorträge*, Bd. i., Herausgeg. von Hirschberg, 1871, p. 47.

8. HAAB, O., *Lehrbuch der speciellen pathologischen Anatomie*, von Ziegler, 1892, p. 940.

9. HORNER, *Handbuch der Kinderkrankheiten*, von C. Gerhardt, Bd. v., Abtheilung 2, 1889, p. 300.

10. KNUS, P., "Klinisches und Anatomisches über den Frühjahrskatarrh der Conjunctiva," *Diss.*, Zürich, 1889.

11. RAABE, H., "Beiträge zur pathologischen Anatomie der äusseren Augenerkrankungen," *Diss.*, Marburg, 1893.

12. REYMOND, "Contribuzione allo studio delle congiuntiviti," *Annali di Ottalmologia*, vol. iv., 1875, p. 329.

13. SÆMISCH, *Handbuch der gesammten Augenheilkunde*, von Graefe und Sæmisch, Bd. iv., 1876, p. 28.

14. SCHOEBL, *Centralblatt für Augenheilkunde*, 1890, p. 97.

15. TAILOR, "Ricerche anatomiche sul catarro primaverile," *Annali di Ottalmologia*, 1891.

16. UHTHOFF, W., "Beiträge zur pathologischen Anatomie des Auges," A. von Graefe's *Archiv für Ophthalmologie*, 29 Jahrgang, 1883, p. 174.

17. VETSCH, U., "Ueber den Frühjahrskatarrh der Conjunctiva," *Diss.*, Zürich, 1879.

18. VIRCHOW, R., *Die krankhaften Geschwülste*, Bd. i., 1863, p. 293.

19. v. WECKER, *Thérapeutique oculaire*, Tome i.

20. ZIEGLER, E., *Lehrbuch der allgemeinen pathologischen Anatomie und Pathogenese*, 1892.

ON TWIN GANGLION CELLS IN THE HUMAN RETINA.[1]

By Prof. R. GREEFF, Berlin.

Abridged Translation by Dr. Ward A. Holden.

(*With three figures on Plate VI. of Vol. XXXV., German Edition.*)

ACCORDING to the later investigations, the retina is to be regarded as a true nervous centre shifted to the periphery. And the optic nerve is, properly speaking, no nerve, but a portion of the cerebral white matter which has been pushed forward. The retina is distinguished from the other nervous centres by its regular structure and the sharp separation of its various layers, to which attention has already frequently been called.

Thus it has happened that in recent years a great number of the articles in the anatomical journals have been devoted to the finer structure of the retina, problems of general interest regarding the finer composition of the nervous system being worked out by investigations on this membrane.

The retina has another extraordinary quality to which insufficient attention has been paid, viz., it is the only nervous structure which is completely transparent. By employing staining methods that do not interfere with the general transparency of the retina and color particular nerve cells only, we are able to examine the entire unsectioned retina under the microscope and study its structures in their natural relations. It is evident that in thin sections many existing communications escape us.

[1] From the laboratory of the Berlin University Eye Clinic. Read before the Berlin Society of Psychiatry and Nervous Diseases, March 8, 1897.

The chief stain which is applicable here is Ehrlich's methylene-blue method of staining living tissues. Other methods, such, for example, as that of Nissl, allow us to study the structure of the cell body better, but no method brings out the protoplasmic processes so beautifully and completely as Ehrlich's. This method has been much employed in studying normal conditions, but for the pathology of the cell it has not, to my knowledge, been used, and I believe that its use in the examination of pathological cases, such as tabes, paralyses, inflammatory atrophy, etc., would best give us a clearer idea as to the purpose of the protoplasmic processes of the nerve cells—whether they serve for nutrition or conduction—and like questions.

Ehrlich[1] introduced the staining fluid into the veins of the living animal, which was killed when the staining process was sufficiently far advanced. As this method proved to be difficult, Dogiel[2] proposed to stain the retina after death by the following procedure: The eye is enucleated as soon as possible, not later than four hours after death, and divided equatorially, after which the posterior segment is divided by meridional sections. One of the portions of the retina so obtained is stripped off the underlying choroid and spread out on a slide with the nerve-fibre layer upward, and the adherent vitreous is left in place to prevent drying.

Several drops of a $\frac{1}{10}$ of 1 per cent. solution of methylene blue are then allowed to fall on the retina or to act on it from one side. In fifteen or twenty minutes the nervous elements begin to take the stain, as can be seen under the microscope. First the axis-cylinders become stained, then the cells. Frequently several hours are required for all the nervous elements to take the stain.

The process may be hastened by keeping the preparations at blood temperature, and examining it every five or ten minutes until the desired degree of staining is obtained.

Thus far the staining is very simple. It is, however, necessary to stop the stain at the right time and to fix it, which is a matter of greater difficulty. When the staining

[1] Ehrlich, *Deutsche med. Wochenschr.*, 1886, No. 4.
[2] *Arch. f. mikroskop. Anatomie*, xl., p. 34.

fluid is allowed to act too long, the capillaries take it up, and finally so many structures become stained that the individual cells are no longer distinguishable. Before fixing the stain, the vitreous is to be carefully removed.

Fixing methods have been proposed by Dogiel, Apáthy,[1] and Kallius,[2] but a very valuable method is that of Bethe.[3] The superfluous stain is washed off with salt water and the fixing fluid poured over the preparation, which is then covered.

The composition of Bethe's fluid is as follows:

Ammonium molybdat.....	1.00
Aquæ dest.....	10.00
Hydrogen peroxid.....	1.00
Acid. hydrochlor. offic.....	1 drop.

This solution does not keep longer than a week. It is best to use it as cold as possible, keeping it on ice. The fluid is allowed to act cold for 2–3 hours, and then to remain longer at the ordinary temperature of the room. After this the preparation is washed for ½–2 hours in distilled water, to remove the ammonium molybdate, and then dehydrated quickly with alcohol, cleared in xylol or oil of cloves, and mounted in Canada balsam.

When a retina is stained in this way, the observer sees at once, and in every case, broad, dark, horizontal strands, which take the stain quickly and most resistantly retain it. At each end of these strands, which are of various lengths, is found a large cell. I first saw these structures in an atrophic retina which I was examining with Dr. Andogsky. In this case the fine protoplasmic processes of the ganglion cells had mostly broken down, and the protoplasmic strand joining the two ganglion cells therefore appeared more distinct (Figs. 2 and 3, Plate VI.).

We were not able to understand this condition until we recalled Dogiel's illustrations in *Archiv. f. Anat. u. Physiol.*, 1893. He in that place first described such communications between two nerve cells of the retina.

[1] *Zeitschr. f. wissensch. Mikroskopie*, ix.
[2] *Anatomische Hefte*, iii., 10, 1894.
[3] *Arch. f. mikrosk. Anatomie*, xliv., 1895.

From one nerve cell there arises a protoplasmic process which is thicker than all the others. This runs directly, without division, and retaining its original thickness, to a neighboring cell. The length of these processes varies greatly. Not only are cells lying close together joined in this way, but also cells lying far apart. This process is very much larger than the other processes, and, under a high magnifying power, it is seen to be composed of a great number of fine fibrils, some of which arise from the substance of each cell and run to the other. In some cases a few fibrils do not run from cell to cell, but, passing out from the process, end free (Fig. 1, *e*, Plate VI.). The fibrils do not run parallel to one another, but deviate, and even assume a corkscrew-like course.

These connections between the cells are found chiefly in the region of the macula, but they are not frequent, and but few cells are joined in this way. Only one of the two cells has an axis-cylinder process, and this cell is usually larger than the other.

All of these cells lie in the ganglion-cell layer, in which Dogiel differentiates three varieties of nerve cells. These cells differ, first, in the manner in which their processes branch; second, in the size of the area through which their processes extend; and, third, as regards the situation in the inner reticular layer of the terminal branches of their processes. The cells differ also in size and form.

Rámon y Cajal also morphologically distinguishes three varieties of ganglion cells: the giant type, the medium type, and the small type; and the pictures obtained by the methylene-blue method of Ehrlich-Dogiel essentially agree with those obtained by the osmic acid, chromic acid, and silver method of Golgi-Cajal.

Dogiel found direct communication between cells of the second type only, but I have found these communications between the large stellate cells of the first type as well.

As regards the relations of the protoplasmic processes of the nerve cells to one another, the views of different authors are not so uniform.

Dogiel believes that the terminal processes of various

cells unite in making up a network, while Cajal believes that each cell is individual and completely independent of every other cell.

Like Dogiel I have searched in vain to find communications between ganglion cells in the retinas of rabbits and doves. It would seem that they are to be found in the human retina only.

Twin ganglion cells have not been found in my Golgi-Cajal preparations, but this is no doubt due to the fact that in this method, as in all the earlier methods, sections were made, and it would have been a lucky chance indeed if the connection between two cells had been preserved, while in Dogiel's method the entire retina is examined intact.

So far as I know, there is nothing in the literature in regard to twin ganglion cells in the brain or cord, though Dr. Nissl has lately had the kindness to inform me that he has seen such structures.

Cajal's investigations have brought to our notice a variety of cells in the retina running horizontally—the so-called horizontal cells which lie between the outer reticular layer and the inner nuclear layer and seem to have the function of bringing into relation different groups of rods. A similar function is doubtless subserved by the communications between the ganglion cells. Since the retina is a true nervous centre of the central organ, the connections between cells may be considered association connections, and we find that the more highly organized the animal, the more numerous are the associations in the retina; the higher associations, viz., the communications between the ganglion cells, exist only in the most highly developed retina, that of man.

Explanation of the figures on Plate VI.

TWIN GANGLION CELLS OF THE HUMAN RETINA.

FIG. 1.—Stellate cells of the first type. Staining of the living tissues by the methylene-blue method of Ehrlich-Dogiel. Fixation by Apáthy's method.

a. A cell without an axis-cylinder process.

b. A cell with an axis-cylinder process.

c. Axis cylinder.

d. Connecting tract.
e. Subsidiary twigs of the connecting tract.
f. Varicosities of the protoplasmic twigs.

TWIN GANGLION CELLS OF AN ATROPHIC HUMAN RETINA.

FIGS. 2 AND 3.

Leitz, Oc. 1, obj. vii.

Staining by the Ehrlich-Dogiel method. The protoplasmic twigs are mostly broken down.

FIG. 2.—Connection between two distant ganglion cells. The tract is swollen and beginning to degenerate. Only slight remnants of the protoplasmic twigs are present.

FIG. 3.—Connection between two adjacent ganglion cells, the axis cylinder in process of degeneration.

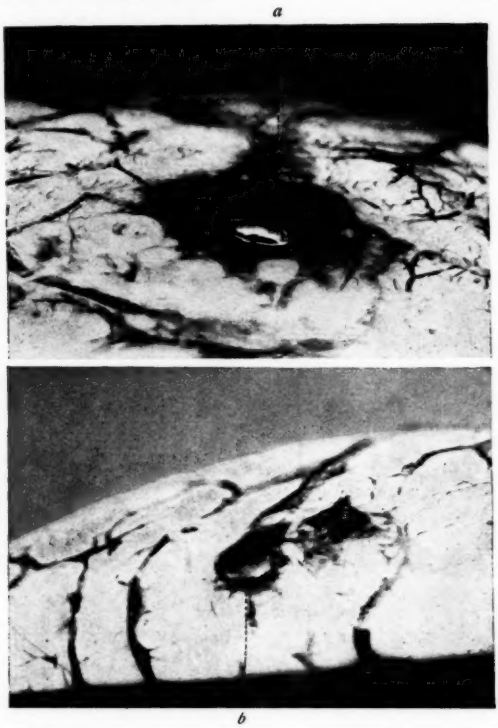


FIG. 1. Metastatic gliomatous nodule on surface of cerebral cortex. *a*, on right side ; *b*, on left side.

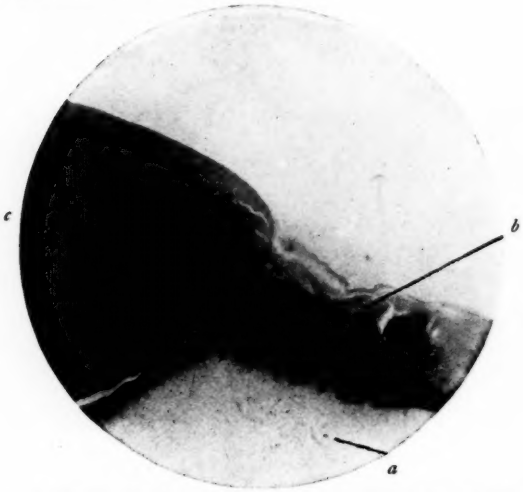


FIG. 2. Section, under low power (× 15), of metastatic nodule, showing situation of nodule beneath the arachnoid, with large and small hemorrhages. Cerebral tissue unaltered. *a*, cerebrum ; *b*, subarachnoid infiltration ; *c*, edge of nodule.

CASE OF GLIOMA RETINÆ AND BRAIN METASTASES, WITH AUTOPSY AND REVIEW OF LITERATURE.

By Dr. F. M. WILSON, Bridgeport, Conn., and
Dr. EDGAR S. THOMSON, New York.

(*With text-plate I.*)

Albert M. L——, age four (Aug. 24, 1898). Small, badly nourished, but somewhat precocious child. Father and mother healthy. Three other children healthy. His eye has "been bad" for four weeks, but they have suspected that something was wrong with it for two months. Child has lost flesh, has nose-bleed, throws up its food, is very fretful, and stays in bed most of the time.

Right eye has ciliary injection; dilated pupil. Tension + 1. *Gray* appearance back of lens, with a fissure running through it. It looks like detached retina covered with exudation. Boy has some pain in right eye all the time. Left eye normal. Enucleation advised and declined.

Dec. 22, 1898.—Have seen him occasionally since August, as have also other oculists, with universal advice for enucleation.

Right eye now has beginning anterior staphyloma. The iris and lens are pressed forward against the cornea; the lens is opaque. The general condition of the child is not much changed. Left eye normal.

Dec. 26th.—The right eye was enucleated at the Bridgeport Hospital. The enucleation was easy. The globe was not ruptured. There was no gliomatous mass in the orbit. Four days later, child was taken ill with scarlet fever, and was quarantined for three weeks. Was not very sick. The orbital wound healed kindly.

I did not see him again until March 1, 1899. His parents said

that for a month after leaving the hospital he gained in flesh, played with the other children, and had no pain whatever. Then pain returned in the right orbit, he lost what flesh he had gained, began to throw up his food again, and to stay in bed. A nodular mass can be distinctly felt in the orbit. Under ether, mass was found to fill posterior half of orbit. Evisceration of orbit was advised and done. For two weeks after the operation he was free from pain and nausea, but did not gain strength.

On March 15, 1899, sight began to fail in left eye, and within two or three days failed entirely, there being no P. L. Pupil was moderately dilated and immobile. No gross changes in fundus.

On March 28, 1899, he had a profuse discharge of a thin fluid from the nose, but his mother, the only person who saw it, does not give a very intelligent account of its appearance or amount. Immediately after this discharge of fluid the left pupil regained its normal size, but was again dilated within six hours.

April 1, 1899.—5 P.M. he died.

Autopsy at 10 P.M., five hours later. Dura mater firmly adherent to vertex. Blood-vessels on surface of cerebrum engorged with blood. Very abundant thin fluid, with flocculi in it, at base of brain. Base and sides of brain studded with round nodules of tissue, which presented the same macroscopic appearance as the tissue which was taken from the orbit. The chiasm was enclosed in a clot of blood, occupying an area of $1\frac{1}{4}$ inches in diameter, and about $\frac{1}{4}$ in. thick at its thickest part. From the right orbit an irregularly shaped mass projected into the cranial cavity, lapping over on to the cribriform plate.

The membranes at base were soaked and softened. Most nodules were entirely distinct, with no apparent connection between them, and were evidently metastatic. The *left* optic nerve, except for a distended sheath, looked normal. Examination of other parts of the body not allowed.

PATHOLOGICAL REPORT.—It is commonly supposed by many of our colleagues that glioma metastases are rare. A literary search, suggested by the editor of these ARCHIVES, shows this not to be true, and we believe the results will be of interest to many ophthalmologists.

The eye, which measured 24 *mm* in length, was sectioned horizontally, and showed the following points: lens opaque, pupil widely dilated, anterior chamber obliterated, ciliary body

atrophied, retina totally detached in "funnel" shape, and closely applied to posterior surface of lens, vitreous absent, a large mass of new growth near the posterior pole involving the nerve and almost filling the posterior half of the vitreous chamber, the remainder of which is filled with a greenish sero-fibrinous fluid.

Microscopical section shows all the above conditions in detail. The mass is composed of round cells with large nuclei, embedded in a scanty intercellular substance. It springs from the retina somewhere near the nerve, and has pushed outwardly, causing an early detachment of the retina. There are numerous clusters of round cells near the ciliary region and scattered areas through the serous effusion. The choroid is infiltrated posteriorly and enormously distended, so that the tapetum nigrum runs through the middle of the mass; there are traces of choroidal tissue to the outer part of the mass. There are numerous newly formed blood-vessels all through the tumor, and in the older part (*i. e.*, retina) there are large areas of necrosis with hemorrhages. The optic nerve is infiltrated with round cells, and the subdural and sub-arachnoid lymph spaces are also full of cells. There are a few indications of the growth along the blood-vessels which perforate the sclera.

Diagnosis. — *Glioma Retinæ Exophytum.*

Secondary orbital growth consists of round cells in small nests throughout the orbital tissue. It resembles closely the original growth, but has not had time to permit it to degenerate.

Cerebrum. — The specimen was hardened in formalin and showed the following points: cerebrum of normal size, membrane adherent in places; a large area of necrosis on the under surface of the right frontal lobe, triangular in shape and extending from the longitudinal fissure and the anterior extremity of the lobe back to the optic commissure and the fissure of Sylvius, which latter it penetrates slightly; an interstitial hemorrhage in the frontal lobe about 3 *cm* in diameter adjoining the necrotic area. The right optic nerve, as far back as the chiasm, is thickened and infiltrated. On the *right cortex*, 2 *cm* above the anterior point of the middle lobe, is a round nodule 6 *mm* in diameter with several smaller nodules near by. A similar nodule is on the *left cortex* 3 *cm* above the middle of the fissure of Sylvius (see accompanying figure). The necrotic mass at the base shows a structure similar to the original growth. The cells have the same size and shape, and the new vessels are numerous and have the

usual imperfectly formed wall. There are large areas of hemorrhage and necrosis. The right nerve as far back as the chiasm is entirely replaced by glioma cells, no trace of the nerve structure remaining. The subarachnoid space of the chiasm and left nerve is filled with cells. The nerve tissue of the chiasm, beyond a few evidences of sclerosis, is normal. Both nodules on the cortex show a similar structure to the rest of the growth. The cells dip down deep into the fissures, and the subarachnoid space, for some distance about the nodules, is filled with cells. The cerebral tissue is normal, but in places the growth appears about to follow the vessels into the cerebral substance. The retinal cells, while varying slightly in size, have the typical size and appearance of glioma cells, as have also those of the nodules on the cortex and the necrotic mass at the base. The cells in the choroid and in the orbital growth are considerably larger, as a rule, and look more like sarcoma cells. They have larger nuclei and more protoplasm. It would seem as if the glioma cells had started a proliferation in the connective tissue of the choroid and orbit. There are also, in both of these portions of the growth, a few imperfectly formed spindle cells.

The recurrence, in all probability, took place in both the nerve and the orbital tissue. It would seem that the mass at the base must have come from a direct continuation of the growth, while the nodules were, of course, metastatic. The cerebral hemorrhage was no doubt the immediate cause of death.

It was impossible to demonstrate the neurogliar character of the cells, as the tissue was not fresh enough when obtained.

Glioma metastases have not been commonly observed. With the aid of Wintersteiner's book, *Das Neuroëpithelioma Retinæ* (Leipzig u. Wien, 1897), and Knapp's ARCHIVES (English edition) I have been able to look over 530 cases covering a period from 1767 to 1899. Out of these, sixty-one cases of metastases are recorded, as tabulated below:

1. Schneider (*Dissert. Inaug. de Fungo Hæmatode*, Berlin, 1821) reports a case with subperiosteal metastases on the right temporal bone. The left eye was the seat of the original glioma.

2. The same author reports a case with "subperiosteal soft swellings" on the outside and inside of the cranium.

3. Lerche (*Vermischte Abhandlungen aus d. Gebiete der Heilkunde von einer Gesellschaft prakt. Ärzte in Petersburg*, i., Samml.,

Nr. 14, 1821). A case, No. 3, with a nodule on the left zygoma. No sections made.

4. Hasse (*Diss. Inaug. de Fungo Medullari*, Berlin, 1823). A case with cranial metastases.

5. Panizza (*Sul fungo midollare dell'occhio*, Pavia, 1826). A case with metastasis to the parietal bone, parotid gland, and right anterior lobe of the brain.

6. Weller (*Die Krankheiten des menschl. Auges*, 4 Aufl., Berlin, 1830). A case of metastases to the cranium, "outside and inside."

7. Middlemore ("Observations on Fungus Hæmatodes of the Eye," *Lond. Med. Gazette*, vol. vi., p. 878, 1830). A case with metastatic enlargements in the liver and kidneys, glands of the mesentery, and one rib.

8. v. Zimmermann (*Abhandlung über den Markschwamm*, Wien, 1832). A case with cranial metastases. Optic nerves not involved.

9. Lawrence (*A Treatise on the Diseases of the Eye*, p. 627, 1833). A case with direct extension to the brain from the left eye. Metastases in the anterior mediastinal glands and in the fourth, fifth, and sixth ribs of the right side.

10. Mühry (*Ad parasitorum malignorum imprimis ad fungi medullaris occuli historiam symbolæ aliquot*, Göttingen, 1833). A case with metastases to the cheek and under jaw.

11. Donegana ("Über den Markschwamm insbes. des Auges, eine nachgelassene Abhandlung," Herausgeg. von Mocchetti, *Anatologia Med.*, December, 1834). A case with metastasis to the cranial bones and right frontal lobe of the brain.

12. Sichel ("De l'encéphaloïde et du pseudo-encéphaloïde de la rétine et du nerf optique," *Iconographie ophthalmologique*, p. 562–588, 1859). A case, No. 3, with metastases in the lymph glands of the mesentery.

13. Vernon and Bowater ("Soft Glioma," *Royal Lond. Oph. Hosp. Rep.*, vol. vi., 2, p. 155, 1868). A case, No. 3, with metastases in the cranium, brain, and glands behind the right ear.

14. Schiess-Gemuseus and Hoffman ("Beiderseitiges Netzhautgliom," *Virchow's Arch. f. pathol. Anat.*, Bd. xliv., 3, p. 286, 1869). A case with cranial metastases, subperiosteal and subdural; also in the upper and lower jaw-bones. Metastases in the liver and retroperitoneal glands.

15. Hjort and Heiberg ("Zur Malignität d. Glioms," *Arch. f.*

Oph., xv., 1, p. 184, 1869). A case with metastases on the frontal bone, temporal lobe of the brain and membranes, and choroidal plexus.

16. Knapp ("On Intraocular Tumors," p. 23, 1869) reports a case in a child eighteen weeks old. The right eye was enucleated and the optic nerve found normal. The left eye was also slightly affected and in two years perforated. At that time six nodules were found in various places on the cranium. Two weeks later the child died and the autopsy showed the cranial nodules to be gliomatous. Other metastases were found in the brain, liver, and lymph glands.

17. Heyman and Fiedler (*Arch. f. Oph.*, Bd. xv., 2, p. 173, 1869). A case with metastases in the ovaries and retroperitoneal glands. Other metastases on the cranium.

18. Battmann (*Diss.*, Leipzig, 1870). A case of bilateral glioma with metastases in the region of the cheek, on the forehead, on the upper jaw, on the sella turcica, and other parts of the cranial cavity.

19. Delafield ("Tumors of the Retina," *Trans. Am. Oph. Soc.*, p. 73, 1870). A case, No. 3, with metastasis to the chiasm. Enucleation, with resection of the optic nerve, was done. Recurrence after four months.

20. The same author reports a case, No. 5, of metastasis to the pericranium. The original lesion had existed six months. Exenteration of orbit. Recurrence after six weeks. Death after three months.

21. Wadsworth ("A Case of Intraocular Glioma," *Trans. Am. Oph. Soc.*, p. 11, 1873). A case with metastasis to the lower jaw and cranium.

22. Torday ("Ein Fall v. Gliosarcom.," *Pester med. chirurg. Presse*, No. 50, p. 785, 1873). A case with metastases on the glabella and right temporal region.

23. Norris (*Phil. Med. Times*, Feb. 8, 1873) reports a case in which a local relapse in the orbit took place, with the formation of cranial nodules similar to the two cases reported by Knapp. No nodules were found in the brain.

24. Knapp (ARCH. OF OPH., 1874–5, p. 1) reports a case with numerous metastatic nodules on the cranium originating between the periosteum and the surface of the bone.

25. Zincke ("Gliom beider Augen," *The Clinic*, Aug. 8, 1874). A case with metastasis in the region of the left ear, extending

forwards to the ala of the nose and angle of the mouth, and upwards to the roof of the orbit.

26. Crespi (*Gazetta medica Italiana-Lombardia*, Nr. 26–28 and 43, 44, 1876). A case with metastasis to the brain.

27. Rusconi ("Rendiconto del R. Instituto Lombardo, Serie II., Vol. IV., Fasc. vi.," *Rivista clinica di Bologna*, Giugno, p. 169). A case of bilateral glioma with numerous secondary nodes of very considerable size on the cranium and in the liver, and smaller ones in the right kidney and in the ovaries. Nodules were also found on the ribs and clavicle.

28. Arcoleo (*ibid.*). A case of secondary tumors on the cranium.

29. Hosch ("Einseit. Netzhautgliom mit multiplen Metastasen," *Klin. Monatsbl. f. Aughlk.*, p. 114, 1878). A case with numerous metastases on the face, cranium, and ribs, and in the cervical glands. The mass had penetrated the sclera, and the head of the optic nerve was involved, although $2\frac{1}{2}$ *cm* behind the globe the nerve was normal.

30. Schönemann ("Beitrag zur Casuistik des Glioma Retinæ," *Inaug. Diss.*, Marburg, 1880). A case in which death occurred eight months after exenteration and cauterization of the orbit. There were metastatic nodules on the angle of the lower jaw, but no local relapse.

31. Lemcke ("Über Glioma im Cerebrospinalsystem u. seinem Adnexen," Langenbeck's *Arch. f. Klin. Chirurgie*, Bd. xxvi., H. 3, p. 525, 1881). A case with metastasis to the jaw-bones.

32. Vetsch ("Über Glioma Retinæ," *Arch. f. Aughlk.*, xi., p. 413, 1882). A case, No. 9, with metastasis to the brain and liver.

33. He also reports a case, No. 21, with metastases in the forehead.

34. He also reports a case (*Arch. Oph.*, vol. xii., p. 59, 1883) in which a relapse occurred, four years after the enucleation of the right eye, in the right parotid gland. Examination showed glioma structure somewhat modified, and excision was successful in preventing a relapse.

In the same paper he cites a case seen in 1862, which he says died from metastasis to the liver with dropsy. There was no autopsy.

35. Meisenbach ("Report of a Case of Gliosarcoma," *St. Louis Med. and Surg. Jour.*, xliv., p. 351, 1883). A case with metastasis to the left scapula and the long bones, especially the lower

end of the left humerus, the ulna, and the radius. Cervical and inguinal glands enlarged.

36. Santos Fernandez ("Gliome ossifiant de la rétine," *Courier med.*, Nr. 1, 1883, and *Recueil d'oph.*, p. 485, 1883). A case with metastases, the locations of which are not mentioned.

37. De Vincentiis (*Ann. d'Ott.*, vol. x., fasc. 4 e 5). A case, six years old, with numerous cranial metastases. Also metastasis to the parotid and cervical glands, and one nodule on the spleen.

38. In the same paper he reports a case of parotid metastasis which was operated upon,—successfully as far as the author knows.

There are three other cases with autopsy reported. No metastases.

39. Dickey (*Am. Jour. Med. Sci.*, p. 486, October, 1884). A case wherein metastatic tumors began on the cranium six weeks after enucleation of the eye.

40. Chisolm (ARCH. OF OPHTH., vol. xiii., p. 47). A case in a child two and a half years old with very extensive cranial metastases. Microscopical examination was not made.

41. Snell ("Retinal Glioma," *Brit. Med. Jour.*, 1884, vol. ii., p. 563, and *Med. Times and Gazette*, vol. i., p. 401). A congenital binocular case, No. 2, with metastases to the frontal bone. The right eye was enucleated and three years later the left. Recurrence took place in the left orbit after twelve months.

42. Rompe ("Beitrag zur Kenntnis des Glioma Retinæ," *Inaug. Diss.*, Göttingen, 1884). A case, No. 3, with metastases in the base of the brain, in the chiasm, and along the blood-vessels.

43. Lukowics ("Beitrag zur Prognostik des Glioma Retinæ," *Inaug. Diss.*, Halle-Wittenberg, 1884). A case, No. 15, with metastasis to the frontal bone.

44. Little ("A Case of Glioma of the Retina—Double Congenital," *Trans. Am. Oph. Soc.*, 1885, p. 717). A case with metastasis to the submaxillary gland.

45. Fouchard ("Du gliome de la rétine," *Thèse de Paris*, 1885). A case, No. 2, with metastasis to the parotid and cervical glands, which show structure similar to the original glioma.

46. Brailey (*Trans. Oph. Soc. of the Un. King.*, 1885, p. 61, and *Lond. Lancet*, ii., p. 1085, 1885). A case with parotid and submaxillary metastases.

47. Da Gama Pinto (*Untersuchungen über Intraoculare Tumoren*, Wiesbaden, 1886). A case, No. 9, with metastases on the

cranium which extended to the dura. Other metastases in the parotid gland and lungs.

48. Capron (*Trans. Am. Oph. Soc.*, 1888, p. 106). A case with swelling of the cervical glands before death (most probably metastases).

49. Bochert ("Untersuch. über das Netzhaut-Gliom," *Inaug. Diss.*, Königsberg, 1888). A case with metastasis to the parotid and a supposed metastasis to the lower epiphysis of the ulna.

50. Lawford and Treacher Collins (*Royal Lond. Oph. Hosp. Rep.*, vol. xiv., p. 51, 1895). A case, No. 2764, with metastases to the brain and spinal cord.

51. Gunn and Treacher Collins ("Curator's Report on Cases of Pseudoglioma," *Royal Lond. Oph. Hosp. Rep.*, vol. xiii., 3, p. 361, 1893). A case with metastases to the parietal bone.

52. Lawford and Treacher Collins ("Curator's Report on Cases of Pseudoglioma," *Royal Lond. Oph. Hosp. Rep.*, vol. xiv., p. 51, 1895). A case with metastasis to the right frontal bone.

53. Schmitz ("Beitrag zur Lehre vom Glioma Retinæ," *Inaug. Diss.*, Kiel, 1891). A case with metastases in the cervical glands on the right side.

54. Bull ("Case of Traumatic Iridochoroiditis, . . . Ending in Glioma," *Trans. Am. Oph. Soc.*, 1892, p. 335). A case with glandular swellings, which seem most probably to have been metastases.

55. Becker ("Beitrag zur Kenntnis des Netzhautglioms," *Arch. f. Oph.*, xxxix., 3, p. 280, 1893). A case, No. 3, with metastases of the chiasm and base of the brain.

56. Wolff ("Über den Markschwamm der Netzhaut," *Inaug. Diss.*, Berlin, 1893). A case, No. 16, with a metastatic tumor the size of a walnut in the optic chiasm.

57. Blumenthal ("Ein Fall von Glioma Retinæ," *St. Petersburg Medicin. Wochenschr.*, 1893, Nr. 1). A case with metastases in the preauricular and cervical glands. Also large nodules in the liver and on the sternum.

58. Van Duyse (Un cas de gliosarcome de la rétine avec recidive et metastases colossales, *Arch. d'Oph.*, T. xiv., Nr. 2, 1894). A case with a large metastatic "retro-maxillary" tumor.

59. The same author reports a case with cranial and liver metastases.

60. Treacher Collins ("Curator's Report," *Royal Lond. Oph. Rep.*, xiv., p. 51, 1895). A case, No. 15, with metastases in the brain and on the nape of the neck.

61. Wintersteiner (*Das Neuroëpithelioma Retinæ*, Leipzig u. Wien, 1897, p. 442). A case, No. 26, with cranial metastases.

RECAPITULATION.

Total number of cases from 1767 to 1899	530
Metastases in	61
Cranial and facial bones	38
Brain (including chiasm 4)	13
Lymph glands, mesenteric, mediastinal, inguinal, etc	10
Parotid gland	8
Cervical glands	7
Skeletal bones	7
Liver	7
Submaxillary gland	2
Ovaries	2
Kidneys	2
Spleen	1
Lung	1
Spine	1
Location not mentioned	1

A CASE OF CONGENITAL IRIDEREMIA.

By ROYAL S. COPELAND, A.M., M.D., Ann Arbor, Mich.

NOT so many cases of irideremia are reported, that the report of a new one should be without interest. A case of this malformation recently fell under my observation.

Dean B., aged three months, is the fourth child of Robert B., aged thirty-three, and Mary B., aged thirty. The other children are apparently normal in every respect, and the parents present no evidences of abnormality. So far as possible to learn, there have been no harelips, eye defects, or congenital anomalies of any sort in either family.

Examination in the dark room revealed entire absence of the iris. The edge of the lens and the suspensory ligament were clearly visible in each eye. The media were clear, and the details of the fundus readily seen. Aside from the absence of the irides the eyes seemed entirely normal.

ATTEMPTED EVULSION OF BOTH EYES BY AN INSANE PATIENT.

By Dr. DAVID COGGIN, Salem, Mass.

Nov. 14, 1892.—Alfred T., aged thirty years, an Englishman, while in a state of religious excitement, had tried to pluck out his eyes. When seen on the following day, the cornea and the membranes of the right eye were adhering to the nose — the eyeball having been completely eviscerated. Lens not found.

The internal rectus muscle of the left eye had been torn from its insertion. Slight exophthalmus.

The anterior chamber was filled with blood. Apparently there was no vision.

Sutures were introduced in the sclera of the right eye (which had been so deftly resected by the victim's finger-nails) in order to make the cicatrix vertical. The left *internus* was shortened — the tendon being elongated — and sutured as in the ordinary operation for advancement.

Healing process normal. A granulation button, however, was excised over the seat of the advanced tendon.

A month later the anterior chamber and pupil seemed normal. Cornea wrinkled, the radii converging towards the insertion of the internal rectus, at which point there was a tendency towards a staphyloma. Fair projection in and down. Behind the lens and in contact with it was a dirty white membrane (presenting no undulatory movement), on the the surface of which two small blood-vessels coursed.— T. Whether there was a detached retina or a plastic exudation was not determined. Subsequently the lens became opaque and an attempt was made to perform a linear extraction. A portion of the lens had undergone a cretaceous change and being adherent it was left behind. The cornea collapsed, it was so tenuous. A pupillary membrane formed which was divided with two needles, but the incision failing to gape, Loring's procedure was afterwards carried out. Later, through the opening there was made out a red reflex above — but the eye was blind. The patient remains in a lunatic hospital, though his former state of excitement has subsided.

REPORT OF THE SECTION ON OPHTHALMOLOGY AND OTOLOGY OF THE NEW YORK ACADEMY OF MEDICINE, OCTOBER 16, 1899.

By Dr. J. HERBERT CLAIBORNE, Secretary.

THE PRESIDENT, DR. PETER A. CALLAN, IN THE CHAIR.

A microscopic specimen of the **conjunctival fold** which is found in some cases of **trichiasis** was demonstrated by Dr. Rudolph Denig. The speaker referred to the description of this condition (congenital distichiasis) by Harlan and Shapringer, and said the specimen showed that there must have been an inflammation between the middle and inner part of the lid in fœtal life.

Dr. W. B. Marple showed a case about which he requested the opinion of those present. The case was that of a child who squinted four months ago. Examination of the eye showed it to be blind. There was posterior synechia and discoloration of iris tissue. Tension was normal. There was a white reflex from the fundus. He entertained the ideas of **glioma** and **iridochoroiditis.** The patient had had scarlet fever, which suggested metastatic choroiditis.

Dr. D. Webster thought it a case of metastatic choroiditis and urged enucleation in order to save the other eye.

Dr. E. Gruening also thought it a case of metastatic choroiditis, but did not approve of enucleation. He did not think the case exhibited the symptoms of glioma.

Dr. H. Knapp diagnosed the case as one of metastatic iridochoroiditis, with no danger to the other eye.

Dr. G. H. Cocks said he had seen a similar case in the Eye and Ear Infirmary. The unpleasant symptoms gave way to atropine and hot water.

Dr. J. H. Claiborne presented a case for Dr. Thomas R. Pooley.

The case had been referred to in the minutes of the preceding meeting. It was that of a young woman who had had **herpes zoster ophthalmicus.** The scars on the brow were marked. Dr. Claiborne called attention to the corneal infiltration which was left as a result of ulceration of the cornea. The infiltration had become very much less under treatment and he considered it probable that the infiltration would largely disappear. He wished to know the prognosis of those present as to its complete disappearance.

Dr. CLAIBORNE also showed a case of typical **Bright's retina** for Dr. Pooley. He said that it had been the intention of Dr. Pooley to make some remarks upon the prognosis of Bright's disease in connection with the typical lesion of the fundus. The patient had been under observation for more than two years, and under treatment of tannate of iron and iodide of potash. The patient looked very well and apparently was very comfortable from a physical standpoint.

Dr. CLAIBORNE also showed a case in which there was **injury of the lens;** a piece of tin entered the eyeball, and was followed by subsequent cataract and glaucoma which was almost total. An iridectomy was performed and a large portion of the lens substance was expressed, until the pupil appeared perfectly black. There was subsidence of tension and rapid recovery took place under the bold use of atropine.

Dr. CLAIBORNE also showed a case of **partial dislocation of the lens into the anterior chamber.** This was the condition when the case was first seen three weeks previously. The man had been struck on the eye with a stick. The lens was dislocated downward into the posterior chamber. The anterior chamber became shallow, and glaucomatous tension supervened. Subsequently the lower portion of the lens fell into the anterior chamber through the pupil. Dr. Claiborne thought the case interesting in that at the time he examined it the lower edge of the lens could be seen as a yellowish-brown crescent, best observed by direct daylight. It could be seen also by artificial illumination with the binocular magnifying-glass of Dr. Edward Jackson of Philadelphia.

Several gentlemen who examined the case stated that the lens was no longer in the anterior chamber. Dr. Claiborne said that he had not seen the case for three weeks and therefore could not speak of it at the present time.

Referring to Dr. Claiborne's case of dislocation of the lens, Dr. TANSLEY referred to a boy who had had dislocation of the lens after being struck with a small piece of wood. Iridodenesis was present. Vision was finally $\frac{20}{30}$ and the symptoms of dislocation disappeared.

Dr. M. L. FOSTER read a paper on **ptosis.** After considering the etiology of ptosis he divided the causes of the condition as follows :

1. Acquired : (*a*) from overweight of the lid due to hypertrophy, accumulated fat, or superabundance of skin ; (*b*) spasm of the orbicularis ; (*c*) paralysis or paresis due to traumatism to the lid or to the motor nerve of the levator palpebræ, to disease, peripheral or central, involving the motor nerve of the levator palpebræ, or to hysteria.

2. Congenital : (*a*) from overweight of the lid ; (*b*) paralysis or paresis from imperfect muscular development of the levator or imperfect innervation of the levator.

The operations for the relief of ptosis were classified as follows :

1. Removal of a portion or shortening of the skin of the lids with or without removal of subcutaneous tissue.

2. Interference with the action of the orbicularis.

3. Advancement of the levator palpebræ.

4. Substitution of the action of the occipito-frontalis for that of the levator : (*a*) by indirect union of the tissue of the lid to the tendon of the occipito-frontalis by means of artificial cicatricial tendons or of permanent sutures ; or (*b*) by direct union of the tissues of the lid to the tendon.

5. Substitution of the action of the superior rectus for that of the levator.

The author said that all cases of ptosis do not demand operation. When operative interference is necessary, operation should be determined by a consideration of the cause in the individual case. Employment of the first class of operations is to be deprecated except in cases which are classified as "*a*" in the congenital and acquired forms, while that of the second should be confined to "*b*" of the acquired. These operations are too often performed when the levator is at fault. Advancement of the levator is rational when the levator appears to have a contractile power and proper innervation. The operations included in the third class are two of Bowman's, Boucheron's, Heisrath's two of

Wolfe's, Gillet de Grandmont's, Everbusch's, Abadie's, Snellen's, and Nicati's. He said that Wilder's forms a connection between the third and fourth classes.

The use of suture of the tendon of the occipito-frontalis was proposed independently by Dransart and H. Pagenstecher ; and, while this is an improvement on previous methods, it is not satisfactory. The author referred to de Wecker's modification of Dransart's and von Graefe's. The first mention of the use of a metal suture for this purpose was made by Gayet in 1891, but in 1895 Mules brought its use prominently forward. Darier's operation was criticised as being inefficient. Due credit was given to Hunt for utilizing the occipito-frontalis without detracting from the originality of Panas's operation. He referred to the latter as difficult and complicated. Tansley's operation was considered a combination of the old modification of Hunt's rather than of Panas's. A modification of Panas's operation by Van Fleet appealed to the writer as the most satisfactory of all operations. He said that the fifth class was represented by two operations, both made public in the summer of 1887, one by Motais, the other by Parinaud. The fifth class of operations seemed contraindicated when there was paralysis or paresis of the superior rectus.

Discussion.

Dr. HEPBURN said he had seen the best results from Van Fleet's operation in the Manhattan Eye and Ear Hospital. He did not consider Panas's operation very easy. He thought that the deepening of the incision into the periosteum by Van Fleet was a good measure.

Dr. TANSLEY said he had not tried Dr. Van Fleet's operation. He said he never could advance the levator palpebræ, because he never could find it. He had also tried subdermal sutures. He had found von Graefe's operation of no value. He was accustomed to combine Panas's operation with von Graefe's, and had done this in several cases.

Dr. VAN FLEET said he wished it distinctly understood that he made no claim to originality in the operation which has been attributed to him. In attempting to carry out the Panas operation, and being unable to understand the idea completely, he had modified the operation as had been described. His object was to put the lid under the control of the occipito-frontalis. The lines in his operation are straight, as opposed to those of Panas, which

are curved. Panas's operation will necessitate a slough, while his modification prevents it. He considered that there is no such thing as an ideal result, but that the operation as performed by him would raise the lid and make a sightly eye. He considers the operation which he performs Panas's operation.

Dr. A. E. DAVIS had performed Van Fleet's operation three times. In this operation the lid does not tend to go lower. He thought that the sulcus produced by this operation was good, and that the brow incision was good. He also thought that the operation of Van Fleet could be done under cocaine anæsthesia.

Dr. H. KNAPP said he did not consider von Graefe's operation so bad as had been indicated. He cited an extreme case of old ophthalmoplegia syph. of both eyes in which it had been done over fifteen years ago, and the eyes permanently brought into view. He considered von Graefe's operation a question of measurements. He did not like the pouch produced by the Panas operation.

Dr. E. GRUENING had seen good results from von Graefe's operation, and did not condemn it. He described on the blackboard his method of passing a suture into the tarso-orbital aponeurosis. He could not regard the operation of Panas favorably. With a combination of the von Graefe operation and Panas's, reefing of the lid would produce a good result. He spoke of Wolfe's operation and also that of Hotz as giving good results.

Dr. D. WEBSTER had had no experience with the operation of Van Fleet, or with that of Panas. He had done twelve operations for ptosis during the past thirty years, and was accustomed to follow the method employed by the late Dr. Agnew, *i. e.*, removing a strip of skin the length of the upper lid and removing the subcutaneous tissue. He had not obtained uniformly good results. He had noticed that Van Fleet's operation in the Manhattan Hospital had sometimes caused great traumatism and reaction. He intended in the future to try Van Fleet's operation.

Dr. LESZYNSKY remarked that the operation must necessarily be for cosmetic purposes. He thought that some operated too hurriedly. He had seen unpleasant results follow the operation. He referred to unsuccessful experiments made by himself and the late Dr. Seguin to stimulate the levator.

Dr. FOSTER closed the discussion. He regretted that he had failed to bring with him cases representing Van Fleet's and

Panas's operations. Both were successful, and he desired to compare them. He declared himself much in favor of Van Fleet's operation ; thought Panas's quite as easy as the former, but said the descriptions were insufficient. He referred to the fact that Panas did not say that his lines were curved—he simply said "lines." He had not seen puckering and sloughing, which had been referred to. He had failed with von Graefe's operation. He also cited indications for operation.

Dr. KNAPP asked the indulgence of the Section for a few moments to refer to a case of **metastatic gonorrhœal conjunctivitis.** He had seen but few of them. The patient was thirty-eight years of age, and one week before had had a gonitis. At first the secretion in the eye was scant and mucous. There were superficial ulcers of the cornea. Repeated examinations of the secretion showed gonococci distinct and characteristic. There was no swelling of the lids at any time. The patient had suffered from a mild form of gleet. The picture was different from the ordinary gonorrhœal ophthalmia. The presence of gonitis and gonococci stamped it as gonorrhœal, and he considered the case one of metastatic gonorrhœal conjunctivitis.

Dr. TANSLEY referred to a case similar to that reported by Dr. Knapp, but he had not examined the secretion bacteriologically.

Dr. VALK thought these cases were not so rare, as he had seen a number of them, but had not examined them microscopically.

On motion the Section adjourned.

REPORT OF THE NINTH INTERNATIONAL OPHTHALMOLOGICAL CONGRESS HELD AT UTRECHT, AUGUST 14–18, 1899.

(*Conclusion.*)

By Prof. R. GREEFF, Berlin.

Translated by Dr. Ward A. Holden.

Neuschüler: **The fibres of the optic nerve.**

In his investigations the author made use of thin longitudinal sections of the nerves stained by Weigert's method. The dark-stained fibres run, in general, parallel to one another toward the disc; but here and there fibres are seen which do not preserve a parallel direction, and leaving the bundle to which they belong pass obliquely into an adjacent bundle. These anastomoses between the different bundles have long been recognized. A new feature was discovered when the region of the lamina cribrosa was examined under a high power. In this location fibres are found similar to the anastomosing fibres mentioned, but differing from them in some particulars. These fibres are found in the region of the lamina cribrosa, particularly at the place where the medullated fibres give up their medullary sheath. They take the stain like the fibres of the nerve trunk but rather more intensely. They are of larger calibre than the other fibres and their course is oblique or almost transverse, so that one fibre may be followed across two or three bundles. These particular fibres are found in the pig, calf, cat, and less frequently in man. Their purpose is not understood.

Wicherkiewicz: **A new operation for epicanthus.**

The author gives a detailed description of the operation he had used for several years. He makes two incisions 8–10 *mm* from

the inner commissure, one toward the upper lid and one toward the lower, the two forming an angle of 60–90° with each other. Two other incisions joining the first make a trapezoidal flap which is removed and the wound closed with sutures. The operation is particularly adapted for cases of excessive epicanthus in which the crescentic fold of skin projects over the inner canthus.

CRITCHETT: **The operative treatment of conical cornea.**

Until seven years ago the author was in the habit of cauterizing the apex of the cone with the galvanic cautery brought to a red heat, and opening the anterior chamber. This method in which only the apex of the cone was cauterized was rather painful. Since 1892 he has modified his procedure and now cauterizes superficially a larger area, avoiding perforation. With a small cautery point brought to a red heat the entire extent of the apex of the cone is cauterized superficially, then with a less heated point a deeper cauterization is made in the middle of the first, care being taken not to perforate the cornea.

The results of this cauterization in two stages are very satisfactory to the author and he commends the operation to others.

CLARK, E.: **The union of corneal wounds.**

The author endeavored to determine by means of experiments on rabbits how long a time is required for the closure of a corneal wound and how long such a wound permitted the passage of infecting micro-organisms.

Under chloroform and ether narcosis the cornea was pierced, upward, with a medium broad lance and the entire aqueous evacuated. The animals were allowed to die in the narcosis. Even within two or three minutes the anterior chamber began to be restored and in fifteen or twenty minutes it had regained its normal depth. In one case, in which the chamber was restored in fifteen minutes, the aqueous humor was evacuated a second time and again the chamber was restored in five minutes.

In a second series of experiments the animals were released after operation. The restlessness of the animals then delayed the closure of the wound and in some cases the chamber had not been restored after two hours.

The incisions made with a lance cicatrize quickly whether an iridectomy is made or not. When the cornea was split with a Graefe knife in a horizontal direction the margins of the wound applied badly and healing was slow. Wounds in the lower portion of the cornea readily became inflamed and the aqueous grew

turbid, probably from the eye being rubbed with the animal's paws.

In order to test the readiness with which corneal wounds may become infected, cultures of staphylococcus aureus were applied fifteen to twenty minutes after incision with the lance, inoculation of the anterior chamber of the other eye being made with the same culture for purposes of control. These experiments showed that suppuration always occurred when the cultures were applied within forty-five minutes after the incision was made. When applied later no infection occurred.

The author's conclusions are as follows :

1. Wounds of the cornea close in the shortest time when the subject remains for some minutes absolutely at rest. Patients should therefore be transported only on the bed on which they lie when operated upon.

2. If the aqueous escapes too rapidly in the course of the operation and the operation can be completed only with a full chamber, a delay of forty-five minutes will cause the chamber to be restored completely.

MORAX : **On the rôle of toxins in the production of conjunctival inflammations.**

It is now recognized that, in the greater number of conjunctival inflammations, the inflammatory process is the result of a proliferation of certain micro-organisms (the gonococcus, Weeks bacillus, diplobacillus, pneumococcus, diphtheria bacillus, etc.) either on the surface of the mucous membrane or in its substance. Morax and others (Coppez) have demonstrated as well that the diphtheria toxin on the conjunctiva is capable of producing the symptoms and lesions characteristic of diphtheria.

Morax has extended his investigations on the action of filtered or unfiltered cultures of particular micro-organisms on the conjunctiva of man and the lower animals. Since the sorts of micro-organisms employed do not grow upon the conjunctiva of animals, Morax devised the method of continuous instillation, which led to such interesting results with diphtheria toxin. He allowed a drop of the culture to be instilled into the conjunctival sac of a rabbit every two minutes for several hours, thus securing a more or less permanent contact of the bacteria and their products with the mucosa. The reaction occurs 2–3 hours after the instillation is begun. It is more severe when the culture is unfiltered, the bacteria remaining alive or having been killed by being heated to

53°. When the culture has been passed through a Chamberland filter and the bacteria removed, the reaction is less marked, which indicates that the active substance in part remains in the bacteria themselves, and in part passes out into the culture liquid. Cultures, whether filtered or not, that are exposed to a heat of 120°, lose their effect in great measure. The reaction due to instillations of cultures of gonococci, Weeks bacilli, diplobacilli, and staphylococci is characterized by hyperæmia of the conjunctiva, more or less œdema, and a varying purulent secretion.

When filtered cultures of the gonococcus are used on the human conjunctiva, a long contact is necessary to produce a reaction. Both in the rabbit and in man the reaction first appears 2–3 hours after the beginning of the instillation, and lasts only a few hours after the instillations have ceased. The slowness with which these toxins are absorbed is in marked contrast to that with which certain substances of animal or vegetable origin and alkaloids are absorbed. Some drops of snake poison will produce a severe reaction in 7 minutes. An equally intense reaction is caused by a solution of abrin, but this does not appear for 20 hours. An explanation of these latter facts is not yet possible.

HERN: **The operative treatment of glaucoma.**

The author believes that we are justified in operating on every case of glaucoma in which there is the slightest chance of success, because it is known that both acute and chronic glaucoma, without treatment, surely lead to blindness. It is granted that the value of iridectomy in chronic glaucoma is questionable, and many operators abstain from operative interference in these cases. In acute glaucoma the value of iridectomy is unquestionable, and if iridectomy is not efficacious, the valuable operation of sclerotomy remains. The author believes that all cases of chronic glaucoma in which the eye is not already blind should be treated like the acute cases.

By glaucoma the author understands an increase of tension in the posterior segment of the ball, and a proof of the correctness of this view he holds to be the fact that the anterior chamber does not take part in the increase, but the depth of the anterior chamber is, on the contrary, diminished by the pushing forward of the lens. The therapeutic indication is to establish a communication between the vitreous chamber and the anterior chamber, which an iridectomy accomplishes.

If the iridectomy which is first made in every case of glaucoma

does not have the desired result, the author proceeds as follows: A Graefe knife is entered through the cornea 2 *mm* from its margin and in front of the coloboma, and the point passed above the lens back into the vitreous chamber and slightly turned before withdrawal in order to secure as free a communication as possible between the vitreous chamber and the anterior chamber. In some cases the operation leads to cataract, and extraction is required later.

The author's statistics are as follows: In 34 % of glaucoma cases, permanent recovery after iridectomy; in 20 %, improvement lasting 1–3 years; in 10 %, recovery after the author's "antero-posterior sclerotomy"; in the remaining 36 %, a final blindness in spite of every possible method of treatment.

Axenfeld and Bietti: **Regeneration of the nerves after optico-ciliary neurectomy.**

It is a well-known fact that sensibility usually returns after neurectomy. How is this to be explained? In experiments, after resection without adaptation of the cut ends, regeneration mostly does not take place, and when it does it is questionable whether it is direct or vicarious, *i. e.*, depending upon neighboring nerves. The manner of repair also is in doubt, whether the active forces are mechanical or chemotropic. In recurrences after resection of the fifth nerve, the pre-formed bony canal comes into question — elements which are wanting in the case of the ciliary nerves. Therefore, at the suggestion of the author, Dr. Bietti of Parma cut in serial sections an eye which had become painful seven years after neurectomy. The sections were stained by the Weigert-Pal method, which stains directly the medullary sheaths. Special attention was directed to the question whether the regeneration occurred vicariously from the anterior ciliary nerves, which physiologically furnish sensation to the extreme periphery of the cornea only, or directly from behind. In the only case previously reported, that of Schmidt-Rimpler's, the posterior nerves were found to have lost their medulla, and were therefore described as atrophic.

The conclusions were as follows:

1. An extensive direct regeneration occurs from behind.

2. Numerous twigs and single fibres find their way through the sclera into the interior of the eye.

3. A considerable portion of the regenerated fibres in this case did not enter the sclera, but formed a retrobulbar cicatrix-neuroma,

which may have been concerned in the pain. It corresponded to the well-known amputation-neuromas. In such circumstances, sensations may be projected wrongly to the periphery.

4. A portion of the regenerated fibres may lack medulla, and, conversely, medullated fibres may penetrate into the cornea. Therefore, in Schmidt-Rimpler's case, the posterior non-medullated fibres may perhaps not have been atrophic.

5. The anterior ciliary nerves were but slightly developed in this case, and did not participate to any extent in the regeneration.

Other investigations will be required before it can be determined whether these conditions are the usual ones.

GRÓSZ : **Neuroparalytic keratitis.**

Grósz distinguishes two forms of neuroparalytic keratitis : the first, that which follows disease, compression, injury or resection of the fifth nerve ; and the second, true neuroparalytic keratitis, which proceeds from cachexia, local hemorrhages, or injuries.

The cause of the former is an ectogenous infection, which is facilitated by the dryness and lessened protection against injury which the anæsthesia causes.

The cause of the latter form is an affection of the Gasserian ganglion.

KRÜCKMANN : **Does primary carcinoma occur in the interior of the eye, or are there ever primary autonomous epithelial neoplasms ?**

The author first describes the known cases of epithelial proliferation in the interior of the eye. He concludes that primary autonomous epithelial proliferations do not exist, because in these cases the proliferation usually followed an inflammation or injury ; they never led to metastases, and never became destructive growths. From many observations of his own, he believed that the process of epithelial proliferation was purely secondary, and that later a development of connnective tissue occurred, through which the epithelial products were completely masked. He proposes the term, atypical proliferation, for the tubular and canal-like arrangements of epithelial cells.

SCHRECK and STÖLTING took part in the discussion.

FRANKE : **On the pathological anatomy of lepra.**

Franke examined three eyes of two patients in different stages of lepra.

In the first case a boy had marginal parenchymatous keratitis.

Bacilli were found in the cornea, ciliary body, and root of the iris. The two other eyes were from an older patient, and both were already in a state of phthisis anterior. The anterior chamber was filled with leprous new-formed tissue, in which iris and ciliary body had been lost. In this new tissue, as well as in the remainder of the cornea, numerous collections of bacilli were found.

The choroid anteriorly exhibited a marked swelling of the suprachoroidea with many bacilli, and the retina anteriorly was greatly thickened by a hypertrophy of Müller's fibres, among which were numerous groups of bacilli.

In one eye the lens was in process of absorption ; in the other, already absorbed.

The posterior portions of the choroid and retina were not much changed, apart from an inflammation of the optic nerve, and no bacilli were found here

UHTHOFF : **Contributions to the subject of injury to the eye from glare.**

By citing several examples, Uhthoff showed how lateral glare might affect central vision, and cited Urbantschitsch's discovery that the coexistence of several excitations increases perception. Schmidt-Rimpler found that moderate lateral illumination improved vision, while intense illumination lessened it.

Uhthoff's experiments show that the disturbance of central vision is greater the smaller the angle which the rays entering from the side make with the line of fixation ; furthermore, the disturbance depends upon the intensity of the illumination.

The more intense the lateral glare and the weaker the illumination of the centrally situated object, the greater the disturbance. In conclusion, Uhthoff presents a case from his practice which will serve as a model for such experimental investigations.

Discussion : SCHMIDT-RIMPLER : Pathological cases had caused him to have constructed protecting glasses for cutting off lateral glare. These were made by Rodenstock, in Munich.

ZWAARDEMAKER and LANS : **On refractory phases in ocular reflexes.**

Prof. Zwaardemaker reported on some experiments made in the physiological institute in conjunction with Dr. Lans. He limited his paper to the subcortical winking reflexes, *i. e.*, those due to stimulation by light or to excitation of the 5th nerve. In man, these reflex actions are generally bilateral ; in the rabbit,

with some limitations, unilateral. He divides the entire reflex process into four phases :

1. A latency measured as reflex time.
2. An active closure of the upper lid.
3. A passive opening of the palpebral fissure.
4. A refractory phase.

The last is the subject of his paper. The duration of the first three phases is respectively 0.1, 0.2, and 0.1 second ; the newly described phase lasts a varying time, at first about 0.1 second, and later a longer time. It cannot depend upon fatigue, since it can be produced by very slight excitation.

The duration of the whole period is learned by determining the critical interval, that is, the length of time between two equal excitations in which the second reflex fails, while the slightest lengthening of the time allows the second reflex to appear. An interval less than 0.5 seconds almost never permitted a second reflex to appear, while an interval longer than 1 second almost always did so.

SILEX : **Pseudomonochromasia.**

Silex reported on a man of forty-five whose eyes, apart from the color sense, had no abnormalities. He complained only of the fact that with diminished illumination his vision was poor. His light sense, as measured with Förster's photometer, was normal. Colors appeared to him different in luminosity only, not in hue. " Nature seemed to him as colorless as a photograph." The Holmgren yarns were as little understood as the other methods of testing the color sense that are commonly used. The colored stripes of the spectrum appeared to him as a series of grays of varying luminosity. Practically, the patient seemed to be totally color-blind. When examined with the color-mixing apparatus of Koenig-Helmholtz, it was found that he did not perceive colors, and that, furthermore, he could compare spectral colors only when they were of similar luminosity. But when adjacent fields contained colors from the opposite ends of the spectrum, *e. g.*, red and blue, a slight difference was perceived even when the colors were of equal luminosity. This observation proved that he had a certain amount of color perception. The case, therefore, was not one of entire absence of color perception, but one of apparent absence.

OSTWALT : **Experimental researches on periscopic glasses.**

In his previous papers on periscopic glasses, Ostwalt had shown by mathematical demonstration that the slightly curved concave meniscus had a periscopic effect, while the convex meniscus required a much greater curving in order to have an equal periscopic effect.

The author has now attempted to control these theoretical results by experimental means. The same test card was photographed, while there were placed in succession before the objective a biconcave lens — 4. D; and the meniscus lenses, + 2. — 6.; + 4. — 8.; .6. — 10.; + 8. — 12; and + 10. — 14. Similar convex meniscus lenses also were used. After photographs had been made with the lenses centred, they were shifted 25° to the right or left, on a perpendicular axis extending back 30 *mm* from the anterior surface of the lens, thus approximating the relations when the eye, looking through a glass, turns 25° to the right or left. In this new position other photographs of the test card were made. Negatives so obtained were enlarged 4–5 times, and positives printed.

It appeared that the sharpness of the image obtained with a decentred lens was about $\frac{1}{10}$ that of the image obtained with a centred lens. The sharpness was $\frac{1}{2}$ in the case of the three least curved concave meniscus lenses. The usual convex meniscus of commerce, + 5. — 1., gave a sharpness barely $\frac{1}{10}$ that of the centred lens. Only one convex meniscus, + 8. — 4., which is very greatly curved, produced a fairly sharp image when decentred.

Coppez: **The treatment of granular conjunctivitis by electrolysis combined with sublimate and jequirity.**

The method which Coppez has employed for the past three years is as follows:

1. Electrolysis of the conjunctival sac. This is done under chloroform narcosis. The negative electrode is placed upon the granulations. A small de Wecker fork of steel serves as the electrode. A current of 4–5 MA. is used. The conjunctiva is scratched superficially, the points of the fork being entered deep only where the granulations are large. The resulting foam and the blood are washed off with sublimate 1:4000. Pain is severe during the operation, but there is not much afterward.

2. Touching the conjunctiva with sublimate 1:4000. A pledget of cotton wrapped about a glass rod and dipped in a sublimate solution is passed 20–30 times over the conjunctiva until slight

hemorrhage is produced. This application is made daily, and is not painful.

3. Pencilling the conjunctiva with a maceration of jequirity 1 : 20. The latter remedy is used mostly in cases of pannus. The application is made but once, three or four days after the electrolysis. The cornea often clears up in an astonishing way.

The course of treatment lasts from three to six weeks. Coppez has treated over 350 patients according to his method, and is satisfied with the almost constant success obtained.

DRUAULT : **On the colored rings one sees about a flame, in normal and pathological conditions.**

A portion of this paper is taken up with a theoretical study of the relations which exist between the size of the colored ring and the size of the elements producing it. These relations permit us, in particular cases, to determine the place of origin of a ring that is capable of being measured. The remainder of the paper is a clinical and experimental study of the colored rings seen about a flame.

There are many rings of this sort, but the author has studied three only, namely, the colored ring of glaucoma and two rings that are physiological.

One of the physiological rings is produced by the fibrillary structure of the lens. Some persons see this in normal conditions ; others only when the pupil is dilated. In general, the instillation of a drop of cocaine is sufficient to bring it to view. After instillation of atropine its appearance may suggest glaucoma. In such cases, if the pupil is gradually covered with a screen the colored ring will vanish towards two opposite points as soon as more than half of the pupil is cut off, thus being distinguished from the colored rings of glaucoma. The apparent diameter of this ring is, for yellow, about 6°.

The second ring studied is smaller, being about 4° in diameter. Various authors who have called attention to this ring consider the anterior surface of the cornea as its place of origin. Although it is difficult to determine accurately the location of the elements which give rise to this ring, the following experiment gives some clue to it. When one looks at a light through a cornea lying in water, a colored ring is seen having a diameter of about 4°. This ring is produced by the endothelium on the posterior surface of the cornea, for if this is scraped off the ring vanishes. When, however, the anterior epithelium has been removed with a sharp spoon, the ring remains.

The colored rings in glaucoma are generally thought to be due to a cloudiness of the deep layers of the corneal epithelium. Donders and others have thought it similar to the lens ring. But the glaucoma ring has a diameter of 8° and, unlike the lens ring, does not disappear toward two opposite points when the pupil is gradually covered. Furthermore it may be shown that the size of the elements which produce the glaucoma ring correspond fairly well in size to elements of the deep layers of the corneal epithelium.

The author further touches briefly upon the colored rings observed on awaking in the morning, in conjunctivitis, and after the action of water or the fumes of osmic acid upon the cornea.

HEINE: **The anatomy of the myopic crescent.** (Presented by Prof. Hess.)

Heine's preparations show that the characteristic distortions at the disc are caused by the different resistance of the three coats of the eye to the distending forces. Since the elastic elements of the choroid yield less readily than the retina and sclera, the elastic lamina of the choroid in its "relative retraction" draws a wedge-shaped fold of optic-nerve fibres in between retina and sclera. If the choroid atrophies in the region of the "relative retraction," a temporal conus develops.

COPPEZ: **The action of certain toxins on the cornea.**

The author endeavored to solve the following problems: 1. By what means can the toxins developed in the conjunctiva act upon the cornea?

In answering this question the author proceeds from the clinical picture of diphtheria of the conjunctiva. In this disease one portion of the toxins formed passes into the general circulation, and another portion mingles with the tears and thus flows over the bulbar conjunctiva and cornea. The conjunctiva absorbs but little of the toxins while it is itself inflamed, because a condition of inflammation always hinders absorption, and toxins, on account of the great volume of their molecules, pass with difficulty through animal membranes. Thus the diphtheria toxin has its effect chiefly upon the anterior surface of the cornea. The epithelium, indeed, offers a resistance to the entrance of the toxin, but as soon as the integrity of this is disturbed in the slightest degree the cornea will become affected. Everything that leads to a lesion of the anterior surface of the cornea leads to an increase in the disease. Lesions of the epithelium may be caused

by our therapeutic measures, or by the rubbing of pseudo-membranes ; moreover, they may be the results of an affection already existing, or, finally, they may be due to the direct action of the toxin, which after forty-eight hours may lead to loosening of the epithelium.

Contrary to the views of Gosetti and Jona, Coppez concludes from his investigations that the tears have no anti-toxic effect on the toxin of diphtheria.

2. What is the action peculiar to each toxin ?

(*a*) The toxin of diphtheria has a very marked effect on the cornea, as was shown in the author's papers published in 1897.

(*b*) Abrin instilled into the conjunctival sac leads to opacity and necrosis of the cornea. The use of jequirity in cases of trachomatous pannus proves that abrin does not act on the cornea by checking the current of blood in the circumcorneal vessels ; this toxin has rather a vaso-dilator effect.

(*c*) The toxin of the streptococcus has but little effect upon the cornea. Coppez believes that most of the symptoms attributed to this toxin by Bardelli did not depend upon the toxin itself, but upon the bouillon used, the dead cocci, and the substances added to the bouillon to kill the cocci.

(*d*) The toxin of the pneumococcus also has but little effect upon the cornea, which is not due alone to a particular resistance of the corneal epithelium to this toxin, as Druault and Petit believe, but rather to the lesser energy possessed by this toxin.

(*e*) The toxins of the staphylococci, studied by Salowiew and Molodorosky, were believed to produce the same lesions as the cocci themselves. But in how far other factors should have been taken into account, such as the bouillon and the like, must remain to be decided by future investigations.

BALL, J. M. : **Excision of the superior cervical ganglion of the sympathetic in two cases of glaucoma and one of atrophy of the optic nerves.**

CASE 1. The patient, a man of thirty-six, had suffered for two months with very painful inflammatory glaucoma in the right eye. R. V = p. l. ; L. V = $\frac{20}{40}$; R. T + 3 ; marked excavation of the disc. Excision of the superior cervical ganglion May 15, 1899. Immediate disappearance of the pain ; T + 2 after the operation, and + 1 three days later. July 23d, fingers could be counted at five feet and the ophthalmoscopic examination revealed a more marked filling of the retinal arteries and a better color in the disc.

CASE 2. The patient, a woman of forty-three, had suffered for two years with simple chronic glaucoma with excavation of the discs. R. V = o; L. V = p. l.; T + 3 in both. June 15th, excision of the left superior cervical ganglion. Two days later L. V = fingers at two and a half feet, eight days later fingers at four feet, the tension diminished on the 16th day. In the meantime the perception of light had returned in the right eye. July 1st, the right upper cervical ganglion was excised; July 23d, R. V = fingers at four inches, T + 1; L. V = fingers at seven feet, T + 3.

CASE 3. The patient, a man of forty-six, complained of gradual failure of vision and for weeks he had been practically blind. R. V = p. l. L. V = o. No history of alcoholism or syphilis. As a last resort, excision of the right superior cervical ganglion was performed, but as yet it has been of no benefit.

Another case of optic-nerve atrophy in which the same operation was done is still under observation.

In simple glaucoma, excision of the ganglion caused an increased flow of blood to the orbit, an increase in vision, and a diminution in the intraocular tension.

The microscopic examination of the excised ganglion always revealed practically identical changes, viz., a hyperplasia of the connective tissue which partly divided up the ganglion into several portions containing nervous elements. In general the process was a sclerosis arising from an inflammation in the neighborhood of the vessels.

The author comes to the following conclusions:

1. Excision of the sympathetic ganglion is a useful operation in simple glaucoma.

2. In acute glaucoma, when iridectomy fails, this operation may be tried.

3. In absolute glaucoma with severe pain the operation should be tried before enucleation is resorted to.

4. The excision of the superior cervical ganglion as well as that of the middle is, if performed *lege artis*, an innocent operation; excision of the inferior ganglion is of greater difficulty and more dangerous.

GUTTMANN, G. **On the treatment of complicated cataract.**

This paper was a continuation of Arnold's report published in these ARCHIVES in 1892 in regard to the results of operation on

complicated cataracts in Haab's clinic. In the past eleven years forty-three eyes with complicated cataract have been treated. The complications comprised excessive myopia with chorio-retinitis circumpapillaris et centralis atrophicans, fluidity of the vitreous, detachment of the retina, posterior synechiæ in cases of shrunken cataract, tremulous cataracta cretacea with secondary glaucoma, iridochoroiditis with cataracta polaris anterior and posterior, the results of sympathetic ophthalmia, progressive lamellar cataract, extensive retinitis centralis senilis with congenital amblyopia, scleritis, disseminate choroiditis, and retinitis pigmentosa. In thirty-two of these cases vision was improved by operation to a degree between the limits V = 1 and V > $\frac{1}{120}$; in six cases vision was not improved; and in five cases it was made worse. Five cases of particular interest were reported in brief. In one case with detachment of the retina and excessive myopia, an extraction of a ripened cataract without loss of vitreous gave the patient V = $\frac{3}{60}$. In a patient with exclusion of the pupil, coloboma upward and downward from operation, and loss of vision for thirty years, extraction of his nuclear cataract in its capsule without loss of vitreous gave him V = $\frac{1}{3}$. In a patient with retinitis pigmentosa and extensive rosette-formed posterior polar cataract, discission and subsequent linear extraction improved vision from $\frac{1}{20}$ to $\frac{1}{4}$. Another patient with retinitis pigmentosa and an extensive posterior polar cataract was rendered capable of working. The acuteness of vision was improved from $\frac{1}{6}$ for distance to $\frac{1}{4}$, and from Sn. 12 for near to Sn. 2, by discission and extraction. Finally, a patient of thirty-eight with disseminate choroiditis, retinitic atrophy of the optic nerves, and anterior and posterior polar cataract, who had not been able to go about alone, after extraction in both eyes had V = $\frac{1}{15}$ in one and $\frac{1}{10}$ in the other.

The prognosis of complicated cataract, providing careful aseptic and antiseptic precautions are taken, is not so unfavorable as many believe, and such unfortunates sometimes obtain better vision than one would expect when the nature of the underlying disease is considered.

KNAPP. **On some rare tumors of the orbit.** (Five cases.)

I. *Three lipomas*, two in the upper and one in the lower portion of the orbit: the first two, circumscribed, removed through the conjunctiva; the third, diffuse, removed through the skin. Excessive exophthalmus, marked disfiguration, eye blind from

atrophy of the optic nerve. After operation patient free from annoyance, and the disfigurement for the most part corrected.

II. *Two large serous cysts.* Exophthalmus, blindness. After a lateral cyst was evacuated and removed a second cyst was discovered behind the eye. It also was evacuated and removed with the orbital fat. The contents were watery. Axenfeld, who examined the preparation, pronounced it a lymph cyst. Smooth healing.

III. *Ossifying large-spindlecelled sarcoma in the depth of the orbit,* separated from the inner wall of the orbit by a layer of connective tissue but adherent outwardly to the internal rectus muscle. Papillitis. Extirpation. Smooth healing. Eye regained its proper position ; V = $\frac{20}{40}$. The encapsulated hard tumor, which felt like a fibroma, proved to be a large-spindlecelled sarcoma with osteoid foci.

IV. *A large dermoid cyst* in the inner-upper portion of the orbit, soft, fluctuating. Papillitis. V and T N. A paracentesis allowed the escape of considerable pus, but a fleshy mass remained. Recurrence. Extirpation two months after the first operation. The capsule, filled with pus and an atheromatous mass, removed entire. Complete recovery. The microscope shows the inner surface of the capsule to be lined with proliferating and partially degenerated epithelium. Only eighty-four of these congenital cysts have been reported.

V. *Encapsulated small-spindlecelled sarcoma* in the inner-upper portion of the orbit erroneously taken to be a cyst. It formed a bluish projection under the conjunctiva and when punctured much viscid liquid escaped. Extirpation without rupturing the capsule, through the skin of the upper lid. Healing good. Microscopically a pure small-spindlecelled sarcoma. The speaker remarked that the most frequent tumor of the orbit was sarcoma, and this fact must always be borne in mind even when in a given case another diagnosis seems more proper.

FOURTH DAY, FRIDAY, AUGUST 18TH.

GENERAL SESSION.

REYMOND: **The surgical connection of the lesser faults of curvature in the optical portion of the cornea.**

The author first discussed the investigations that had been made to discover the effect on corneal curvature of an increase or

diminution in intraocular tension. He passed then to the relations existing between the results of these investigations and the resistance to increased tension shown by ophthalmometric examination. The changes which the optical portion of the cornea undergoes in various affections of the cornea and the ocular coats, prove, like the experimental investigations, that lessened resistance of the basal portion of the cornea and the limbus can modify the degree of curvature of the central optical portion of the cornea without altering the physiological type.

The author then took up the changes in corneal curvature observed after cataract operation and discussed in detail the well-known attempts at an operative correction of astigmatism by means of perforating or non-perforating wounds of the cornea, limbus, or sclera. In conclusion, the author stated that no positive rules for the operative treatment of astigmatism could be drawn up, because not only have we no means of increasing or decreasing the resistance of any particular portion of the cornea, but there is no possibility of regulating the degree in which the resistance should be increased or diminished.

KNAPP: **On the symmetry of our eyes and a uniform designation of the meridians, based upon it.**

The author stated that it was one of the duties of the International Congresses to decide upon units of measure, value, and strength, and to unite upon uniform designations to be applied to the results of investigation. The ophthalmologist must determine every day the angles of the principal meridians of eyes, note them in his records and reports, and send them to the optician who grinds the correcting lenses. At present this is done in various ways. The meridians of the eye, and particularly of the cornea, are, regarded individually, asymmetrical curves, hence the astigmatism, but their relation in the two eyes to the median plane of the body or the vertical median plane of the eyes, which is parallel to the former plane, is in a high degree symmetrical. Our visual apparatus is a symmetrically arranged paired organ like our ears, hands eyes, and others. In more than 80 per cent. of cases the meridians of the eyes are practically symmetrical; in the other cases they approximate symmetry, and only in a few cases are they asymmetrical, *i. e.*, that corresponding principal meridians are inclined to the nasal side in one eye and the temporal in the other.

The speaker referred to the tabulated results of the examination

of 2473 patients who were astigmatic in both eyes, as showing how constant was this law. As the most satisfactory method of designation, both scientifically and practically, he recommends that in which from the nasal end of the horizontal meridian, 0°, for both eyes the scale runs upward, the diagonal toward the nose being numbered 45°, the vertical 90°, the diagonal toward the temple 135°, and so on through the entire circle. In this way one obtains a regular, uniform, readily comprehensible designation for the meridians of astigmatism and of the visual field, according to the principle of symmetry. The limits of the visual fields of the two eyes form entirely symmetrical figures.

SESSION OF THE SECTION.

HEINE: **Contracted and relaxed ciliary muscle** (read by Professor Hess).

Heine has succeeded in fixing monkeys' eyes both in accommodation and at rest in warm Flemming's solution, thus rendering them suitable for microscopic study. Eyes in which eserine had been instilled showed the ciliary muscle lengthened anteriorly and inward—the hyperopic form. Eyes in which atropine had been instilled showed the myopic form of the muscle.

The system of Fontana's spaces is unfolded in the eye with eserine.

Further preparations of monkeys' eyes demonstrate the favorable effect of posterior sclerotomy on the relations of the chamber angle.

PFLUEGER: **A new chart for determining color blindness.**

Since blue-yellow blindness is so rare that in examinations it may usually be left out of account, Pflueger contents himself with a red chart on which is laid gray in thirty-six shades according to Hering.

PFLUEGER: **On the determination of acuteness of vision for near in highly myopic eyes.**

The author had photographically reduced his test card to $\frac{1}{10}$. The card is mounted on a stand and the far point can be accurately measured, and the acuteness of vision at every centimetre of distance computed.

GREEFF: **The nature of Fuchs's atrophy of the optic nerve.**

Fuchs made the discovery that in the periphery of the optic

nerve connective-tissue septa run concentric with the pial sheath. External to these septa no nerve fibres are found in the optic nerve, but only a fine network. Fuchs called this condition peripheric atrophy of the optic nerve. Greeff showed that this was not an atrophy but a physiological neuroglia sheath such as surrounds the entire central nervous system.

WEBER, A.: **The operative treatment of astigmatism.**

The author made many experiments in regard to the changes in corneal curvature following sections made with lances of various curvatures. He also measured the astigmatism following glaucoma and cataract operations. Sections made with the Graefe knife were not considered on account of the unavoidable irregularity in puncture and counterpuncture. Of 112 cases of glaucoma in which a lance 6–9 *mm* broad was used, it was found that in the meridian dividing the wound the refraction sank 0.5–2.5 D, while in the meridian at right angles it rose 0.5–3 D. On an average, the astigmatism produced was 2.76 D. For lance incisions of 10 *mm* (in cataract operations), a constant astigmatism of 1.75 remained; for an incision of 11 *mm*, 1.67; for 12 *mm*, 2.25, lasting for some weeks or months. It disappeared entirely in 24 % of the 10 *mm* sections and in 26 % of the 11 *mm* sections, but never in the 12 *mm* sections. When a flat-backed lance of 11 *mm* was used, the permanent astigmatism increased to 2.75 D. The location of the section is of great importance. Only after he had made these preparatory observations did Weber undertake operations for the correction of astigmatism. But the results of operation were so unsatisfactory that he now employs such procedures only in astigmatism of high degree when with the most careful correction vision is still poor.

SCHIECK, F.: **The primary changes in ribbon-shaped keratitis.**

Schieck described a fresh case of ribbon-shaped keratitis examined both clinically and microscopically. Contrary to the recent claims that the calcareous deposits in Bowman's membrane were secondary, following primary inflammatory processes in the superficial layers of the cornea, he found that in fact the deposition of chalk in Bowman's membrane was the first symptom of the ribbon-shaped corneal opacity, the calcification of the membrane being found in his case without any signs of inflammation in the neighborhood.

BOECKMANN: **On trachomatous pannus and its treatment by peritomy.**

The author proceeds from the view that trachomatous infection sets up in the subconjunctival tissues a chronic inflammatory condition, *i. e.*, a sort of tarsitis, episcleritis, etc., and that while the original affection of the conjunctiva can be improved and finally cured by proper treatment, the deeper inflammatory foci remain latent and resist every medicamentous treatment. Trachomatous pannus, he believes, is the result of chronic scleritis. One of the most rational means of combating it is peritomy, favorable reports of its use being heard from various quarters. The circumcorneal zone of invasion is destroyed by the peritomy and replaced by dense scar tissue extending into the cornea. This sound scar tissue forms a barrier to the extension of the trachomatous process; the pannus decreases gradually in density and slowly becomes absorbed.

The author's technic is as follows: a strip of conjunctiva 2–3 *mm* broad is removed about the entire circumference of the cornea, multiple scarification is then done in this exposed area until white healthy sclera is seen, and the wound is then left to close by granulation. The excision of the strip of conjunctiva alone will not cure the scleritis which brings about the pannus; an essential element of the operation is the scarification.

Usually the reaction after the operation is moderate, consisting in œdema of the lids, chemosis, and considerable secretion. The vascularization of the cornea at first increases, new arterial loops spreading over the cornea. The circumcorneal wound soon fills up with healthy granulations. The eye is washed out with 5 % solution of protargol. In the course of the second week the wound cicatrizes and the pannus rapidly clears up. After a month the patient is discharged with instructions to use an antiseptic wash.

The results of peritomy are quicker the more radical the operation—a sure indication that the sclera is the actual seat of the disease. If one operation is not sufficient, a second or even a third may be made. The speaker has done this operation in thousands of cases over a period of twenty years and regards it as unattended with any dangers.

SCHOEN: **The changes in the eye of the child that are produced by spasms.**

The author endeavored to demonstrate anatomically the changes in the lens and retina that are brought about by spasm of the ciliary muscle and lead to lamellar cataract. These changes he

states consist essentially in vacuolation of the cells of the retina and the fibre cells of the lens.

ROGMAN: **On pseudo-accommodation in aphakia.**

Rogman in his investigations has not used ordinary cataract patients, but patients from whom the lens had been removed for high myopia. By this means many sources of error are eliminated. He began by determining the refraction by retinoscopy, then obtained the acuteness of vision for distance, then tried reading tests with Snellen's types and noted the distance at which they could be read. During the examination the lids were held apart either with the fingers or a lid elevator. Persons examined in this way showed a pseudo-accommodation of 2–5. D, with the limitation that at the near point the acuteness of vision was less than at the far point.

According to the author, the pseudo-accommodation is to be explained through the so-called neutralization of the diffusion circles or more likely through the physiological irregular astigmatism, *i. e.*, the physiological polyopia (Salzmann).

The author then calls attention to a number of practical points. Besides the actual pseudo-accommodation which the aphakic eye possesses, we are not to forget the artificial pseudo-accommodation which depends upon the patient's holding the glasses nearer to or farther from the eye, or looking obliquely through the margin of the glass. The patient's attention should be directed to the latter points. In order to keep the diffusion circles as small as possible, the operation for cataract should be done without iridectomy when possible, thus favoring pseudo-accommodation. Pseudo-accommodation is to be taken into account in operations for myopia also.

TREACHER COLLINS: **Anatomy and congenital defects of the ligamentum pectinatum.**

The author studied the relations of the chamber angle in various animals and in a number of human embryos. Besides this material he had at his disposal several cases of microphthalmus and congenital glaucoma. His conclusions were as follows:

1. In almost all mammals the ligamentum pectinatum is more highly developed than in man. In these animals it consists of an outer lamellar zone with interstitial spaces, and of a cavernous zone with large, irregular cavities. The human eye has no cavernous zone, both zones being combined into one in the chamber angle.

The angle proper extends farther outward in man than in the lower animals.

2. The extent of the ligamentum pectinatum stands in a certain relation to the size of the cornea and eyeball. The decrease in volume in the cornea and eyeball in man is attended with a simplification of the structure of the ligamentum pectinatum and a displacement of the chamber angle outward.

3. In the development of the human eye various stages are to be observed, in which can be noticed the relations between the development of the iris angle and the relative size of the cornea. These various stages of development are exactly identical with those observed in animals.

4. In the human eye that has been retarded in its development one finds the same relations of the ligamentum pectinatum as in animals.

5. In eyes with congenital increased tension and stretching of the tissues the ligamentum pectinatum resembles that of the lower animals, having a cavernous zone.

From these observations the author concludes that the simplifying of the ligamentum pectinatum and the displacement of the chamber angle outward facilitates the outflow of the intraocular liquids, which is the more necessary the narrower the zone of the ligamentum pectinatum is in relation to the volume of the ball. In congenital anomalies of the ligamentum pectinatum the outflow of intraocular liquid is not hindered, and the tension remains normal only when microphthalmus exists. If the eye has its normal volume, there must be a disturbance in the outflow of intraocular liquid, with its results, viz., increased tension and stretching of the ocular walls.

Dor: **On the treatment of detachment of the retina.**

The author called attention to the fact that in 1893 he had reported a case of spontaneous recovery from detachment of the retina in both eyes, with resulting vision of 1 in one eye and $\frac{3}{4}$ in the other, after seven years' duration of the affection. Since then numerous cases of this sort have been reported, and 136 are now known, but compared with the frequency of detachment this percentage is very small. In the years 1887–1899 the author has seen fourteen complete recoveries in twenty-one cases treated in the following manner: subconjunctival injections of 20 % salt solution, applications of the Hourtelloupe, and punctate cauterizations of the sclera; each of these procedures being used once weekly in alternation.

In cases of detachment of the retina, one must not idly look on, but must treat the case, and the method employed by the author is quite free from danger, and is followed by undeniable results.

BIELSCHOWSKY: **On the vision of patients with squint.**

The author asked the following questions:

1. How does the squinting eye localize the impression received?

2. What part does it play in the construction of the visual field?

Besides the familiar methods, the after-images were used as suggested by Tschermak for determining the foveal line of vision of the squinting eye. While in a portion of the cases the normal correspondence of the retinas was preserved, both foveas projecting their impressions in the same general direction, in some cases there was an abnormal localization, the fovea of the squinting eye having a line of vision different from the other. The angle corresponding to the deviation from the normal corresponded more or less exactly to the angle of the squint, but in particular cases there was considerable departure from this condition. Frequently there was found, particularly in periodic squint, an apparently irregular alternation of normal and abnormal localization. In one case the simultaneous employment of the normal and abnormal localizations led to binocular triple vision or monocular diplopia.

In ordinary vision, as a rule, the images of the squinting eye are not regarded. Under certain conditions we may obtain typical double vision in cases with undisturbed correspondence; in most of the other cases the visual field seems to be composed of portions seen uniocularly but furnished by both eyes. In but few cases is there a common visual act, and this represents only a rudiment of the normal binocular visual act and differs fundamentally from the latter.

The prospects of therapeusis are quite independent of the rôle which the squinting eye plays in the visual act; there is in all cases a possibility of obtaining binocular vision by proper treatment, provided that the amblyopia of the squinting eye does not render this out of the question.

KOSTER: **On the elasticity of the sclerotic, and its relation to the development of glaucoma.**

The determination of the elasticity of the sclera by means of excised strips of that membrane gives results which are not reliable. Accurate results may be obtained, however, by estimating

the increase in the contents of the eye when the intraocular tension is raised regularly.

DE LAPERSONNE: **On optic neuritis in consequence of inflammations of the sphenoidal sinus and diseases of the posterior nasal cavities.**

In a previous report the author called attention to the various symptoms on the part of the eye and the orbit that might arise in the course of inflammations of the sinus, and alluded to the fact that not rarely it was the eye symptoms which drew our attention to the affections of the sinus that are so often overlooked. Further experiences have enabled him to confirm all that he said at that time, but in the present paper he limits himself to the relations which exist between affections of the sphenoidal sinus and the higher portions of the nasal cavity, on the one hand, and certain symptoms on the part of the optic nerve, on the other hand.

According to Berger, to whom we are indebted chiefly for our knowledge of the surgery of the sphenoidal sinus, the most frequent ocular symptom due to inflammation of the sphenoidal sinus is a retrobulbar neuritis localized in the optic canal and at first not presenting any ophthalmoscopic changes. Other authors, such as Nieden and Panas, have observed choked disc, but both of these patients died of purulent meningitis and the cases are not convincing since there were at the same time extensive pathological changes on the floor of the skull.

In the three cases which the author records there was unilateral choked disc, which suggested the correct diagnosis and led to the discovery of extensive pathological changes in the sphenoid and the posterior ethmoidal cells. There were wanting the ordinary signs of disease of the sinuses, such as severe neuralgias, photophobia, lachrymation, blepharospasm, and erysipelas-like redness of the root of the nose.

Berger believes that certain forms of atrophy of the optic nerve which develop in the period of growth are to be referred to an irregular development of the sphenoidal sinus, leading to compression of the nerve in the optic canal. In a similar way, though more rapidly, the visual disturbances may arise from infectious processes in the ethmoid. Thus an acute neuritis or perineuritis may develop in the portion of the nerve that lies within the optic foramen, and manifest itself through a sudden amaurosis or a concentric contraction of the field. The ophthalmoscopic picture is normal at first, but later atrophy of the nerve is seen.

Without doubting that retrobulbar neuritis may develop in this way in the optic canal, I believe that the cases reported of choked disc fall rather into the category of infectious neuritis whose origin is not understood. Choked disc depends upon the conduction of the infection along the sheaths of the optic nerve, and not, as the Schmidt-Rimpler-Manz theory proposed, upon a stasis of liquids in the sheaths. If the neuritis is bilateral, the cause is certainly behind the chiasm; if unilateral, anterior to the chiasm.

In infectious processes in the orbit and in cases of orbital tumor, choked disc is not rare. Inflammation of the sphenoidal sinus is not a rare affection but one frequently overlooked. Rhinopharyngitis superior is also a very frequent and very obstinate affection, which under the influence of a fresh infection, such as influenza, measles, or even an acute coryza, can extend to the sphenoidal sinus. The involvement of this sinus may be manifested through the symptoms described by Berger and Kaplan, or these may be almost altogether wanting, or the symptoms that are present may be disregarded by physician and patient until complications on the part of the optic nerve excite suspicion.

In every case of unilateral choked disc, therefore, the sphenoid, the posterior ethmoidal cells, and the upper posterior portion of the nose are to be examined carefully, and this examination will often lead to the discovery of the point of origin of the infectious inflammation of the optic nerve.

The opening of the sphenoidal sinus by Zuckerkandl's method leads to recovery from the original affection but has no effect upon the optic nerve, which slowly goes on to atrophy.[1]

MACKENZIE (London): **The localization of foreign bodies in the eye by means of the X-rays.**

Mackenzie hit upon the idea of photographing foreign bodies in the eye stereoscopically, thus making an estimation of depth possible and considerably facilitating localization. He demonstrated a series of Rœntgen-ray photographs of foreign bodies in the orbit.

GOSSMAN: **Localization of foreign bodies in the eye by X-rays.**

Beginning with a case of perforating injury of the ciliary region in which the X-ray demonstrated the presence of a foreign body

[1] Holmes (these ARCHIVES, 1896, p. 460) reported a case of complete blindness in one eye with restoration of sight after opening the sphenoidal sinus.—*Trans.*

although the possibility of it was denied by the patient, the author has used a very simple method of localization.

He makes use of the movements of the eye for localization, the source of light remaining fixed on the other side of the patient. Two skiagraphs are made, one while the patient is looking up, and the other while he is looking down. Thus, if the foreign body is in the anterior portion of the ball, its image will have travelled downward in the second skiagraph, while if it is in the posterior portion of the ball, the image will have travelled upward. If in the lower half, the image will have travelled backward, and if in the upper half, forward. If the shadow remains fixed, the foreign body must lie near the centre of rotation of the eye. In such cases more skiagraphs are to be made, the eye being moved meanwhile in a horizontal plane.

NICOLAI: **On the tension of the ocular tissues.**

Nicolai showed that even the retina is stretched by the intraocular pressure. In eyes that had been punctured, the retina was found to be a fifth thicker than in others. The retina is, therefore, compressed by the intraocular pressure. The choroid when relieved of the intraocular pressure becomes twice as thick.

THORNER (Berlin): **A new fixed ophthalmoscope giving images free from reflexes.**

Thorner's apparatus is undoubtedly the best demonstrating ophthalmoscope that we possess.

It shows the fundus magnified as in the erect image, and the field, with the pupil dilated, is four or five times as extensive as the field seen in the inverted image with the ordinary three-inch lens. Furthermore, the image is absolutely free from reflexes. This is obtained in the following way: The light coming from a lamp fixed on the apparatus passes through a semicircular opening the size of half the pupil. This light, by a complicated mechanism, is projected on one half of the pupil, while the other half of the pupil remains dark. Returning rays from the fundus pass through the unilluminated half of the pupil to the observer and no reflex is seen.

DOR, JR.: **The projection of colored photographs.**

Dor projected photographs of microscopical preparations in their natural colors. This was done according to the system of Lumière Brothers in Lyons, which is still in part kept secret. Yellow, red, and blue plates are made, the gelatin films are then removed and superimposed, and a positive prepared. Sections

stained with Biondi's tricolor stain showed the natural colors satisfactorily.

OLE BULL: **Pathological changes in the retinal vessels.**

Bull described the changes of the retinal vessels due to contusions and to syphilis, and presented colored drawings of these conditions.

Of nine cases that he observed after injury three were cured. This indicates that these were not eyes with previously existing vascular disease which the contusions had made worse, but that the trauma itself was the cause, for of forty-six non-traumatic cases only three recovered. Improvement occurred in both categories chiefly when there was narrowing of the vessels here and there. In syphilis the disturbances often lead to scotomas, so that an accurate perimetric examination often will lead to the discovery of vascular disease.

GRÓSZ (Budapest): **Tabic atrophy of the optic nerves.**

Grósz presented statistics as to the ocular symptoms and particularly the optic-nerve atrophy of two hundred tabic patients. In eighteen cases he was able to examine the optic nerves anatomically. His results correspond to the generally accepted views on the subject. In rare cases he found a central scotoma, but this he believes to have been due to a complicating toxic amblyopia. He believes that the primary lesion in tabic optic-nerve atrophy is in the ganglion cells of the retina.

GROSSMAN (Liverpool): **Listing's law and its relations to paralyses of the ocular muscles.**

As is well known, Listing's law shows that the eyes may be moved from the primary position to any other without movements of torsion. This is usually demonstrated by the relation of the after-images of vertical and horizontal lines. But since the statements of observers have varied so greatly in reference to the latter, Grossman has repeated the experiments on his own eyes and those of others, using a perimeter arc with a strip of celluloid to which was attached a colored strip that could be turned and shifted laterally. He found, in accordance with Hering's view, that no actual torsion occurred, although there was an apparent torsion from false projection when the image was projected on a plane surface instead of on the arc. The same was found in three cases of isolated paralysis of the ocular muscles. When these patients projected the images on the perimeter arc there

was no torsion perceptible, but the usual torsion appeared when they were projected on a flat surface.

LAVAGNE (Monaco): **The treatment of congenital nystagmus.**

Lavagne found that a girl aged ten with marked congenital nystagmus was much improved by wearing a diaphragm which improved the vision, and also prevented the pinching of the lids together from being of much service.

LANDOLT: **A reform in the designation of prismatic glasses.**

Landolt believes that prisms should be designated according to their deflecting power and not according to their angle. Since the deflection varies somewhat with different directions of the incident rays, he would designate the prism according to the angle of minimum deviation. Prisms numbered in this way are at once brought into relation with the deviation of the eye.

HOT (Christiania): **Ophthalmometric studies on the human eye after death.**

The author undertook a series of ophthalmometric measurements on eyes enucleated soon after death, the work being done in the laboratory of Javal and Tscherning. He found that no marked changes in curvature took place after death. The curvature of the posterior surface of the cornea also was measured. The cornea has the form of a concave meniscus. The cornea of the new-born does not differ much in curvature from that of the adult.

PFALZ warned against putting much confidence in determinations of astigmatism in dead eyes. BERRY called attention to the fact that very slight pressure could bring about changes in curvature.

SULZER: **On color perimetry.**

A color sensation may be produced by simple spectral light as well as by combinations of pigments.

Since pigments vary in composition, differ with different illuminations, and change in the course of time, they are not sufficiently exact for perimetry. Sulzer therefore uses colored glasses. He obtains a uniform intensity of color by using a diaphragm before the glass. The opening in the diaphragm is enlarged until the perception of color is just obtained. Then the diaphragm is opened a certain multiple of the size of the first opening. He finds that when such glasses are used the fields are the same for all colors.

A perimeter according to this principle has been constructed by M. Roulot (Giroux, successeur), rue de l'Odeon, Paris.

PFALZ (Düsseldorf): **On perverse astigmatism.**

Pfalz examined 2574 eyes with uncomplicated errors of refraction sufficient to require correction, and made central and excentric corneal measurements with the ophthalmometer at various intervals of time up to four years. He comes to the following conclusions:

1. The cornea from youth on undergoes a constant change in curvature in the sense of a correction of its asymmetry. This asymmetry, pathological cases apart, is, up to the tenth year, an astigmatism according to the rule. The flattening is most evident in the vertical meridian, beginning at its periphery.

2. The lenticular astigmatism has, with increasing age, a greater part in the total astigmatism. Lenticular astigmatism, even the accommodative, is always against the rule.

3. A correction of corneal astigmatism against the rule by an opposing lenticular astigmatism never occurs.

4. After the sixtieth year astigmatism against the rule predominates. According to the author's figures it is present in 61.3 % of all cases of astigmatism at this age.

Between	50	and	60	years	the	astigmatism	against	the	rule	is 38.8 %
"	40	"	50	"	"	"	"	"	"	39.3 %
"	30	"	40	"	"	"	"	"	"	24.7 %
"	20	"	30	"	"	"	"	"	"	10.12 %

of all cases of astigmatism.

EXHIBITION.

There was an exhibition in the upper halls of the University in connection with the Congress. The historical department was of particular interest. Two large halls were filled with portraits, manuscripts, books, and medals of the two great Dutch oculists, Boerhaave and Donders. Besides these we saw an interesting reproduction of the papyrus Ebers, an ophthalmoscope used by v. Graefe, and instruments that had belonged to Anel.

In Kagenaar's room were the instruments with which Donders made his famous experiments; and, among others, the pakeidoscope with which Pramen, in 1853, observed the changes in the form of the lens images in accommodation; a corneal microscope devised by Donders and Mulder, that is also adapted for measuring the depth of the anterior chamber; the phærophthalmotrope;

the cycloscope of Donders and Küster; the spectroscopic apparatus for effecting comparisons of color; an instrument with a mouth-piece devised by Donders for autoöphthalmoscopy; Donders's isoscope; the horopteroscope, etc.

Snellen had his phakometer, the red and green optotypes with complementary-colored spectacles for discovering simulation, the color circle, and the apparatus for demonstrating the direction of rays of light in the eye.

Kagenaar had his astigmometer. Greeff exhibited colored plaster-of-Paris impressions of diseased conditions of the eye, and Thorner showed his demonstrating ophthalmoscope, which aroused considerable interest.

BOOK NOTICES.

I. **Refraction and How to Refract,** including sections on optics, retinoscopy, the fitting of spectacles, etc. By JAMES THORINGTON, A.M., M.D. A handy octavo-volume of 294 pages and an index, well printed on good paper with 200 illustrations, 13 of which in colors. P. Blakiston's Sons & Co., Philadelphia, 1900. Price, $1.50.

The author, whose popular monograph on retinoscopy has just appeared in the third edition, has permitted his publisher to support the strength of his name by eight lines of titles, the first of which is: adjunct professor of ophthalmology in the Philadelphia Polyclinic; the last: resident physician and surgeon, Panama Railroad Co. at Colon (Aspinwall), Isthmus of Panama, 1882–1889, etc.

This book is an excellent guide in a course on the errors of accommodation, refraction, and motility of the eye. It is complete and altogether practical, presupposing only a minimum of knowledge, and supplying all that is necessary in order to learn and master intelligently this large and most important department of ophthalmology. Chapter i.—the optical introduction, 49 pages—gives a clear description, with many illustrations, of the indispensable physical foundation of the physiological refraction of the eye, which is treated of in chapter ii., 42 pages: acuteness of vision, mechanism and amplitude of accommodation, etc. Chapter iii., methods of ophthalmoscopy. The following chapters are on emmetropia, hyperopia, myopia, astigmatism and its tests, retinoscopy, muscles, asthenopia, and examination of asthenopia and its causes. Then follow, in the manner of a drill course, chapters ix.–xii.: how to estimate refractive errors, giving practical examples of the variety of cases, and explanations and instructions as to the different kinds and frames of spectacles and eyeglasses and how they should be fitted. H. K.

II. **A Manual of the Diagnosis and Treatment of the Diseases of the Eye.**—By EDWARD JACKSON, emeritus professor of ophthalmology in the Philadelphia Polyclinic, etc. Philadelphia: W. B. Saunders, 1900. Price, $2.50.

This book (a small-octavo volume of 604 pages, with 178 illustrations and 2 colored plates) "is intended"—the preface announces—"to meet the needs of the general practitioner of medicine and the beginner in ophthalmology." Without offering, so far as the reviewer can see, any particular features, it sustains the reputation of the author as being a well-educated, clear-headed, and industrious worker.

The apportionment and distribution of the subject-matter are happy, and the limitation and condensation of the exposition highly commendable. The selected bibliographies at the end of the different chapters will be appreciated by those that want to seek further information. The volume preserves a just medium between the unattractive compendium of the undergraduate and the elaborate treatise of the specialist. It will find its recognition and make its way as a true text-book. H. K.

MISCELLANEOUS NOTES.

ANNOUNCEMENTS.

The XIIIth International Medical Congress will be held in Paris, August 2–9, 1900. All doctors of medicine are entitled to membership by making the proper application and paying $5. The American National Committee consists of Dr. WM. OSLER, of Baltimore, as president, and for the several associations their respective presidents,—for ophthalmology, Dr. F. O. WADSWORTH, of Boston. The general president of the section on ophthalmology is Professor PANAS of Paris; secretary, Dr. PARENT, Paris. There will be *three subjects for general discussion*, viz.:

1. Toxic and infectious optic neuritis, introduced by Bellarminoff, Nuel, and Uhthoff.

2. The cortical centre of vision, by Bernheimer, Angelucci, and Henschen.

3. Enucleation and the operations to replace it, by Pflüger, Snellen, Swanzy, and De Schweinitz.

The N. Y. Eye and Ear Infirmary is to be enlarged by the addition of a pavilion for contagious diseases.

The *Annals of Ophthalmology* and the *Annali di Ottalmologia* have agreed on the simultaneous publication of selected articles in both journals.

Contents of the last number of the Archiv für Augenh.,

No. 2. Issued Nov., 1899.

8. H. SCHULTZ, Berlin. The older and newer mydriatica, miotica, and anæsthetica in ophthalmology.

9. J. W. H. EYRE, London. Tuberculosis of the conjunctiva. Translation of the English original. The latter, with 2 plates, appears in this number.

10. ST. BERNHEIMER, Vienna. The anatomical demonstration of the uncrossed optic fibres in man.

11. L. HEINE, Breslau. Further contributions to the anatomy of myopic eyes.

12. H. KNAPP. On the injection of a chloride of sodium solution into collapsed eyes (author's translation from these ARCHIVES).

13. W. T. LISTER. Report of the proceedings of the ophthalmic section of the British Medical Association, Portsmouth, August, 1899.

14. R. GREEFF. Conclusion of the proceedings of the IXth International Ophthalmological Congress at Utrecht, August, 1899 (translated in this number).

15. Conclusion of the systematic report on ophthalmology in the second quarter of the year 1899 (translated in our No. 6 of last year).

CONTENTS OF VOLUME XXIX., NUMBER 2.

PAGE

1. Report of a Case of Orbital Cavernoma Removed by Krönlein's Method, with Preservation of the Eyeball. By Dr. **Arnold H. Knapp,** New York 141

2. Iritis, the Result of Dental Irritation. By **B. L. Millikin,** A.M., M.D., Cleveland 145

3. A Case of Contusion Injury of the Eyeball, Followed by Fulminant Glaucoma; Recovery without Operation. By **H. L. Myers,** M.D., Norfolk, Va. 150

4. Contributions to the Diagnosis, Symptomatology, and Statistics of Congenital Color-Blindness. By Dr. **Wilibald A. Nagel.** Abridged Translation by Dr. WARD A. HOLDEN. (With four figures on Plate II. of Vol. XXXVIII., German Edition, and one diagram in the text) 154

5. Glaucoma after Neuro-Retinitis Albuminurica. A Contribution to the Pathological Anatomy of Glaucoma. By Dr. **Eugene Wehrli.** Abridged Translation by Dr. WARD A. HOLDEN. (With Plates A–D of Vol. XXXVII., German Edition) . . 169

6. Clinical Reports of Two Cases. By **V. L. Raia,** M.D., Providence, R. I. 188

7. The Palpebral Reaction of the Pupil—(Galassi). By **H. Gifford,** M.D., Omaha, Neb. 191

8. Report of the Meeting of the Section on Ophthalmology and Otology of the New York Academy of Medicine, held Monday Evening, January 15, 1900. By Dr. **J. H. Claiborne,** Secretary . . 196

9. Systematic Report on the Progress of Ophthalmology in the Third Quarter of the Year 1899. By Dr. **St. Bernheimer,** in Vienna; Dr. **O. Brecht,** Prof. **R. Greeff,** Prof. **C. Horstmann,** and Dr. **R. Schweigger,** in Berlin. With the assistance of Dr. G. Abelsdorff, Berlin; Dr. Swan M. Burnett, Washington; Dr. Dalén, Stockholm; Dr. Herrnheiser, Prague; Prof. Hirschmann,

PAGE

Charkow; Dr. Krahnstöver, Rome; Dr. P. von Mittelstädt, Metz; Prof. Da Gama Pinto, Lisbon; Dr. Sulzer, Paris; W. J. Lister, F.R.C.S., England; Dr. C. H. A. Westhoff, Amsterdam. Translated by Dr. WARD A. HOLDEN 204

A.—Dr. C. HORSTMANN. General ophthalmological literature, 204; General pathology, diagnosis, and therapeutics, 206; Instruments and remedies, 211.

B.—Dr. ST. BERNHEIMER. Anatomy, 214; Physiology, 216; Refraction and accommodation, 219; Muscles and nerves, 221.

C.—Dr. R. SCHWEIGGER. Lids, 224; Lachrymal apparatus, 227; Orbit and neighboring cavities, 228; Conjunctiva, 232; Cornea, sclera, and anterior chamber, 236.

D.—Dr. O. BRECHT. Lens, 239; Iris, 240; Choroid, 240; Vitreous, 242; Glaucoma, 242; Sympathetic ophthalmia, 244.

E.—Dr. R. GREEFF. Retina and functional disturbances, 244; Optic nerve, 246; Injuries, foreign bodies (parasites), 249; Ocular affections in general diseases, 251.

10. Book Notices 254

III.—Das Sarkom des Auges. By Dr. R. Putiata Kerschbaumer.

IV.—Die Neurologie des Auges. By Dr. H. Wilbrand and Dr. A. Sänger.

V.—The Refraction of the Eye. By A. Edward Davis, M.D.

VI.—Skiascopy. *The Keystone* (organ of the optical trades).

VII.—The American Year-Book of Medicine and Surgery. Under the editorial charge of George M. Gould, M.D.

VIII.—A Pocket Medical Dictionary. By George M. Gould, M.D.

11. Miscellaneous Notes 259

Resignations and Appointments.

Hospital News, Society Meetings, etc.